PS

THE PREVENTIVE MAINTENANCE MONTHLY

1953 Series

ISSUE 14

BULLDOG EDITION

BE SELFISH WITH THIS TANK

Let's face it men, this is another new vehicle made to take you and a gun to wherever you'll need to shoot at somebody who's shooting at you.

If you gotta go, get in the first shot, and get back in time for dinner, you'll have to keep your Bulldog well fed, well groomed, and in general good health. You take the best care of yourself when you take care of conditions that affect you.

This, as President Eisenhower said a few weeks back, is the sort of thing we call "enlightened self-interest."

This special issue of PS Magazine is to help you take care of some of those conditions. As your newspapers and newsmagazines tell you what goes on in the world by the day and week, PS is your month-to-month technical newsmagazine of what's happening with your equipment between issues of TM's, TB's and other references.

Nearly all of what's in this issue is new since TM 9-730 (June 51). In fact, there's so much new during all the time a vehicle like the T41 is proving itself out in practice, Ordnance is ready to give you all kinds of help when and where you may need it.

Wherever there's a T41 you'll most likely find Ordnance Corps Technicians, Ordnance Instructor-Inspectors, and/or Cadillac service representatives who are ready, willing, and anxious to answer your questions, get you service on parts that may not be listed in the Supply Catalog you have on hand, and keep you posted on special tools and equipment you'll need for special situations.

It's up to you to take full advantage of all this help. Read what's here before you ride. Be selfish. Be enlightened. Learn how to get where you're going and get back again.

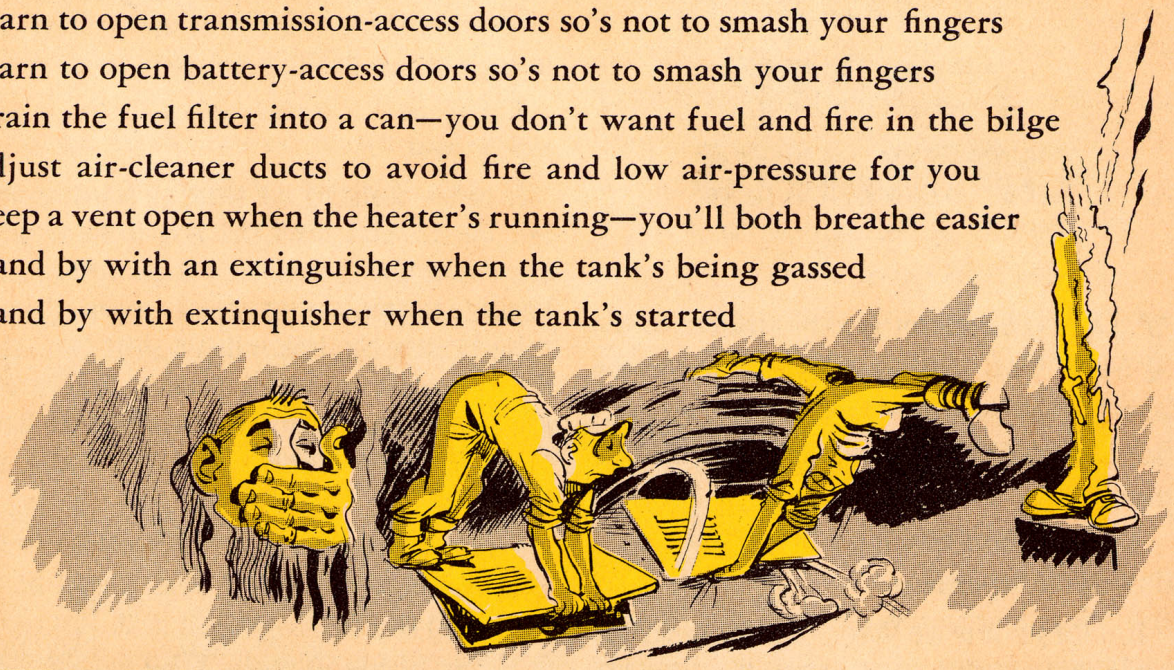
attention major unit commanders

This issue of PS Magazine is devoted entirely to the Light Tank Family of vehicles and will be of greatest use to units whose mission will include some relationship with the 41-series chassis. Others will find the issue useful for orientation only. You'll want to plan a special distribution to get the most copies to where they will do the most good. Each crew member should have a copy for ready reference, and one of the special data cards should be kept handy for use when starting and running tanks.

a few ounces of how to

KEEP OUT OF TROUBLE

Avoid walking on linkages—they bend
Avoid stepping on battery covers—they short circuit
Avoid stepping on engine-fan shroud—you'll hit the fan
Learn to open transmission-access doors so's not to smash your fingers
Learn to open battery-access doors so's not to smash your fingers
Drain the fuel filter into a can—you don't want fuel and fire in the bilge
Adjust air-cleaner ducts to avoid fire and low air-pressure for you
Keep a vent open when the heater's running—you'll both breathe easier
Stand by with an extinguisher when the tank's being gassed
Stand by with extinquisher when the tank's started



TANK NUMBER

First thing to get acquainted with is the number on your tank. Most of what you'll do with this tank and to it, in operation and maintenance, will depend in some way on when it was made and what's already been done at the factory, in the field, or in the modification depot. Most directives you'll get will deal with groups of tanks in the same family, by blocks of numbers.

The early models #1 thru #257 (if not yet modified) have the number on the outside hull, behind the right headlamp.

Later model numbers are stamped on a 5x8 plate mounted at the top-right of the rear hull plate. The number on the top-right is the Manufacturer's number.

TURRET

HOW THE T41E1 TURRET OPERATES

THE T41E1 turret is very similar to the M47. You can traverse the turret by hand or by power, but the gun can only be elevated by operating a hydraulic pump.

Here's a run down on how your turret should be operated:

1. If the gun is in the TRAVEL position, before you try to move anything first unlock the gun-travel lock. (Unscrew the wing nut and raise the upper half of the lock from the gun barrel. Have someone inside the turret elevate the gun to clear the lock, then close the lock cover, tighten the wing nut, and swing the cradle down until it's engaged in the spring-loaded latch.)

2. Check the oil in the oil-gear reservoir. The filler cap with attached dipstick is under the commander's seat (Fig. 1). It should be up to the FULL mark at all times.

3. Check the turret-traverse lock. Turn the handle clockwise to unlock. (When locking the turret, use either the turret-traverse lock or the gun-travel lock —never both at the same time because it often leads to buggering up the traversing-gear teeth.)

4. Turn on the master switch in the driver's compartment.

5. Before operating the turret by power, remember: The batteries won't last long if the turret is operated without one of the engines running. (For training purposes, use the auxiliary engine. If you're going to move the tank within a short time, start the main engine and keep it revved up to 1000-rpm.) Also be sure the vehicle is located where the turret can be traversed without the gun ramming into something.

6. Now look at the traverse safety-switch on the turret ceiling forward of the radio. It must be ON (Fig. 2). It's on when its red light is lit. This switch is for the loader to cut the turret's traversing power whenever he needs to go behind the gun to get ammunition from the hull.

7. Turn on the AUTOMATIC switch located on the

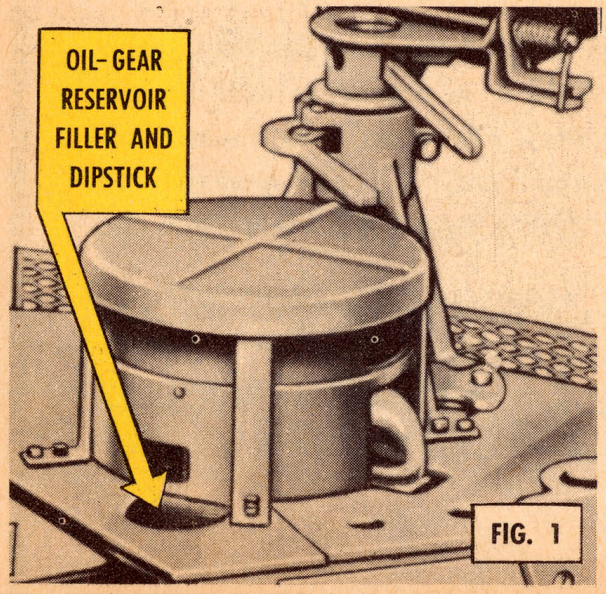


FIG. 1

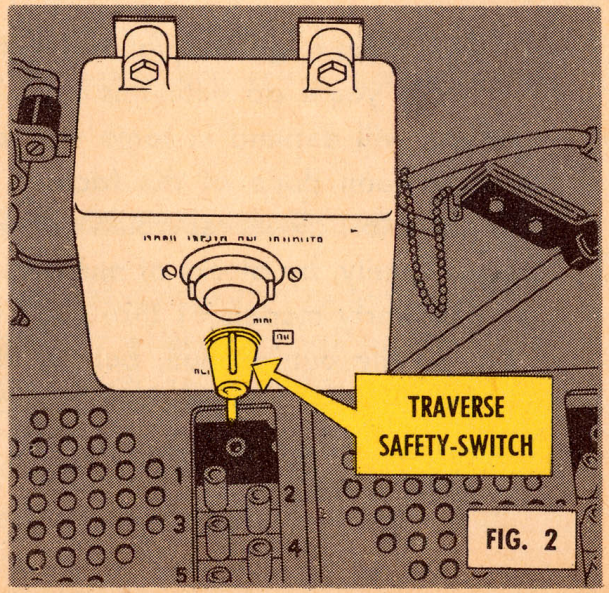


FIG. 2

fire-control box, on the bulkhead to the right of the gunner (Fig. 3). A green light above the switch lights when the switch is on. (The automatic switch and the traverse safety-switch must be on to start the traversing motor.)

8. Flip the toggle switch at the left of the gunner's handle to the POWER position. Now you're ready to power traverse the turret.

9. To turn the turret left, rotate the gunner's handle (spade-type grip) to the left; to go right, rotate the handle right. The amount the handle is moved regulates the speed of the turret.

To go from power to manual traverse, all you have to do is to flip the toggle switch from POWER to MANUAL and traverse the turret with the hand crank. (When in this manual position—only the gunner can traverse the turret—the commander's handle is dead as far as operating the turret, but it still has the power to fire the gun.)

Elevation is controlled by the hand-elevating pump. To elevate the gun, crank the handle clockwise—to lower the '76, crank it counter-clockwise. If the elevating-pump handle works spongy and doesn't control the gun effectively, put more pressure into the system by pumping the hand supercharge-pump that's located to the right of the gunner's seat. Two or three strokes is usually enough. While pumping, turn the hand-elevating pump at the same time so you can "feel" when the gun elevates OK. Never overcharge the system or you'll blow the sleeves out of the pump. You can tell overcharging when the elevating pump handle begins to freeze up.

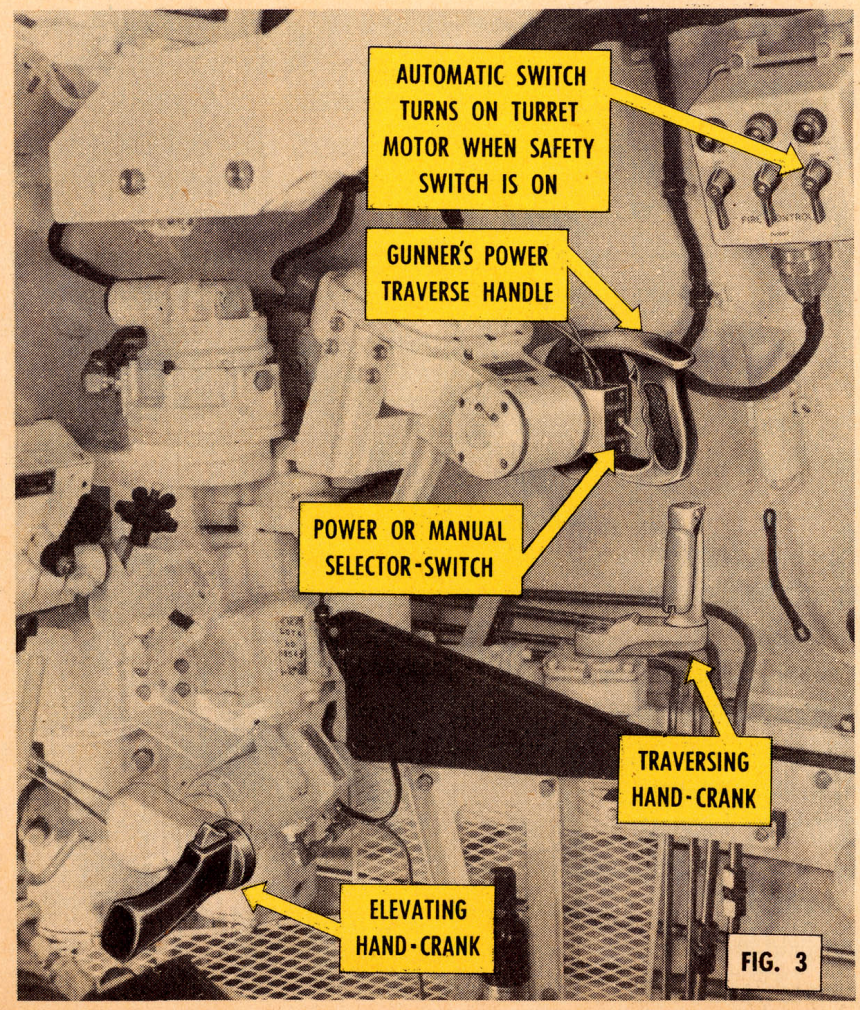


FIG. 3

The commander's override handle lets the commander traverse the turret only when the gunner is in POWER traverse. By squeezing the switch on the back of the handle the commander takes control away from the gunner, and he rotates the handle to traverse the turret. The commander cannot traverse manually or elevate and depress the gun—only the gunner can do this.

A Word About

HYDRAULIC ACCUMULATOR-PRESSURE

Hydraulic accumulator-pressure must be kept up to 900 psi*. When you first get your tank, elevate and depress your gun a couple times. If it's slow to raise, stroke the hand supercharge-pump that's located to the right of the gunner's seat. If the pump doesn't help much, chances are the accumulator pressure is down.

Have Ordnance regulate the accumulator pressure, and then keep your eye on the pressure for a few weeks until the system is broken in —and to make sure no leaks develop.

Then have Ordnance check the pressure every month thereafter.

*Pounds per square inch.

Bleeding Gun-Elevating Hydraulic-System

AIR in the lines of the hydraulic gun-elevating-system causes jerky action in raising and lowering the gun and unsteady gun position. Correct this by bleeding the lines in the system.

Here's how it's done:

1. Use the hand-elevating pump, elevate the gun to maximum elevation but not **tight** against the stop, and block in this position.

2. Open the valves on each side of the dual-relief valve and the bleed valve on top of the elevating cylinder (Fig. 4).

3. Pump the hand supercharge-pump until a good stream of oil (without air spurts) comes through all three valves. (Bleed hoses should be used if you can get them, so that oil can be caught in a container instead of spurting all over the fighting compartment.)

Note: Don't elevate gun during bleeding.

4. Close all three valves while pumping hand pump.

5. Depress and elevate the gun several times with the hand elevating pump, applying sufficient supercharge pressure to move the gun to maximum depression and maximum elevation.

6. If the gun continues to move erratically, there's still air in the system. Repeat the bleeding process and test again.

Note: During the bleeding operation, oil level in the reservoir must be kept at proper level.

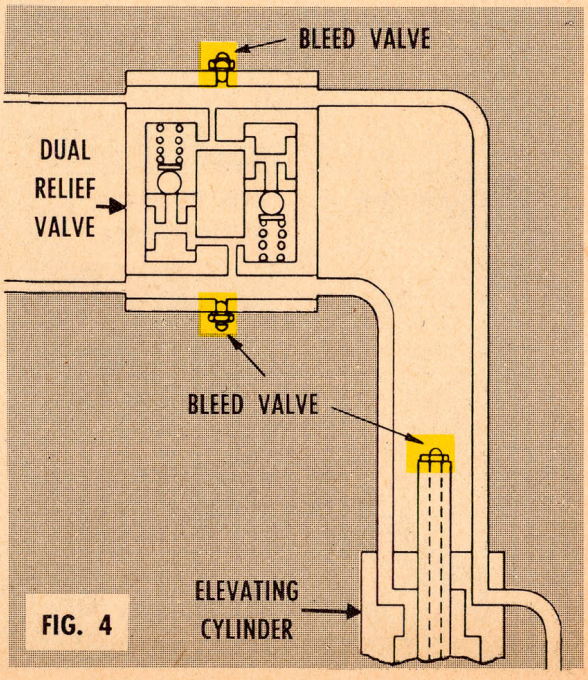


FIG. 4

T41E1 turret trouble-shooting

TRAVERSING

TROUBLE	SEQUENCE OF CHECKS				
	1st	2nd	3rd	4th	5th
1. Takes off in full slew.	L	G			
2. Traverse one direction only.	S	G	A	B	F
3. Overshoots on stop.	H	C	G	I	J
4. Surges in tracking.	P	C	G	F	I,J
5. Surges or jumps in slew.	M				
6. Large handle-dead-spot.	N				
7. Low maximum or high minimum tracking rate.	O				
8. Does not traverse with power on.	S,G	P,A	B,E	L,F	J,R,Q
9. Dump switch in manual-turret moves.	K				
10. Hand traverse-handle spins.	D				

ELEVATION

TROUBLE	SEQUENCE OF CHECKS				
1. Gun drops.	OO	AA	BB	CC	
2. Hand elevating-pump inefficient.	OO	GG	DD	FF	HH
3. Rapid loss of supercharge.	OO	II	JJ	KK	
4. Gun vibrates and blurs sights.	FF	LL	NN		
5. Gun drops considerably after rough terrain operation.	OO	GG	FF	MM	
6. Effort on hand elevating pump is high after rough terrain operation.	DD	EE			

TRAVERSING CHECKS

A Loose wire on signal motor.
(Check connections.)

B Bad Bendix plugs.
(Check connections.)

C Low gear-box preload.
(Tear down and adjust.)

D Worn or faulty No-back.
(Replace No-back.)

E Stuck gear-box clutch.
(Replace clutch or check Allen screw for tightness and add lock washer if missing.)

F Faulty relay box.
(Shut off Loader's safety switch; leave firing switch in ON position; check to see if electrical system is operative.)

G Isolate trouble between electrical and balance of system by operating turret with feed-back shaft only—if OK, trouble is electrical or in feed-back shaft.

H Check feed-back shaft for backlash.

I Check differential preload 5 to 10 ounce-inches.

J Check clutch torque 1½ pound-inches minimum.

K Adjust centering.

L Stuck teeter bar.
1. Pilot valve stuck or bent.
2. Follow-up pin stuck or bent.

M Relief valve in traversing motor set too low. (Shim to higher pressure.)

N Dead spot on handle adj. in handle.

O Maximum tract adj. in handles.

P Low on oil in reservoir.

Q Faulty gunner's handles.

R Faulty commander's handles.

S Possible signal motor trouble. Check by turning off loader's safety switch and turning on automatic switch. Rotate gunner's handle to right and left. Listen for signal motor as you do this. If OK, signal motor can be heard to operate in both directions.

ELEVATION CHECKS

AA Isolate elevating cylinder for check of cylinder seals.

BB Isolate elevating cylinder and dual relief-valve—Check relief-valve.

CC No-back has failed after check of AA and BB. (Replace.)

DD Check valve is stuck—clean out or replace.

EE No-back has failed. (Replace.)

FF Bleed system.

GG Supercharge pressure is low—Pump hand supercharge pump.

HH Hand elevating-pump has failed.

II Accumulator pressure (N_2) is low—replenish 900 psi N_2 charge.

JJ Accumulator bag has failed.

KK Hand supercharge-pump has failed. (Replace.)

LL Loose pivot points on elevating cylinder. (Tighten up or replace.)

MM Adjust dual relief-valve.

NN Check sighting equipment for looseness.

OO Check for hydraulic leaks in tube connection.

Note: Naturally, have Ordnance do the chores that are out of your echelon.

how the T41E2 turret operates

The only difference between the T41E1 and the E2 is the turret-control system. It's known as the Cadillac turret control traversing and elevating system—designed for simpler operation and maintenance, and to give you more ammunition space in the turret.

Here's how it should be operated: As with the E1, the locks must be released before the turret can be moved. The travel lock is the same as the E1's, but the turret lock has been changed. It's in front of the gunner, ahead of the traverse-gear box (Fig. 5). To unlock the turret, pull the handle out, disengage the splines, turn the handle to the left about ¼-turn, and re-engage the handle into the spline. To lock the turret, turn the handle to the right and do the same. If the teeth don't engage, traverse slightly with the hand crank until they do. As with the E1—the turret lock and the gun travel-lock should not be used at the same time.

Before traversing, make sure the engine grille-doors are closed, and that any loose gadgets around the basket are out of the way. And it's a good idea to hand crank the turret before power traversing—just to make sure the turret isn't locked. The turret turns in the same direction as the crank.

To power traverse, follow these steps:

Turn ON the master switch and start one of the engines. The traverse motor is only 1½ horse, but it still draws enough amps from the batteries to warrant steady recharging.

Turn on the traverse switch (located on the turret ceiling above the gun breech) to start the traverse motor. This switch also acts as the loader's safety switch so he can cut the power when he needs to.

Now, turn the gunner's power-traverse wheel, which is mounted on the traverse box in front of the gunner. Turn the wheel to the left to traverse the turret to the left. Turn right to traverse right. When you turn the wheel slightly, the turret will barely creep. The more you turn the wheel from it's neutral point, the faster the turret will traverse.

To elevate or depress the gun, there's a handwheel mounted on the side of the gun cradle (Fig. 5—Inset A). Turn it clockwise to lower the gun and counter-clockwise to raise it. (Tension fingers on the wheel let you get the force you need to operate the gun up or down.)

The gunner's firing trigger is located on the elevating handle. Before pressing the trigger to fire, first set the 76mm or cal. .30 switch on the fire control box to the ON position.

Since the commander has a better view of the country-side than the gunner, he's provided with a set of controls that let him override the gunner's controls either in elevation or traverse if he spots a target that the gunner can't see. The commander's controls are all incorporated in a single pistol-type

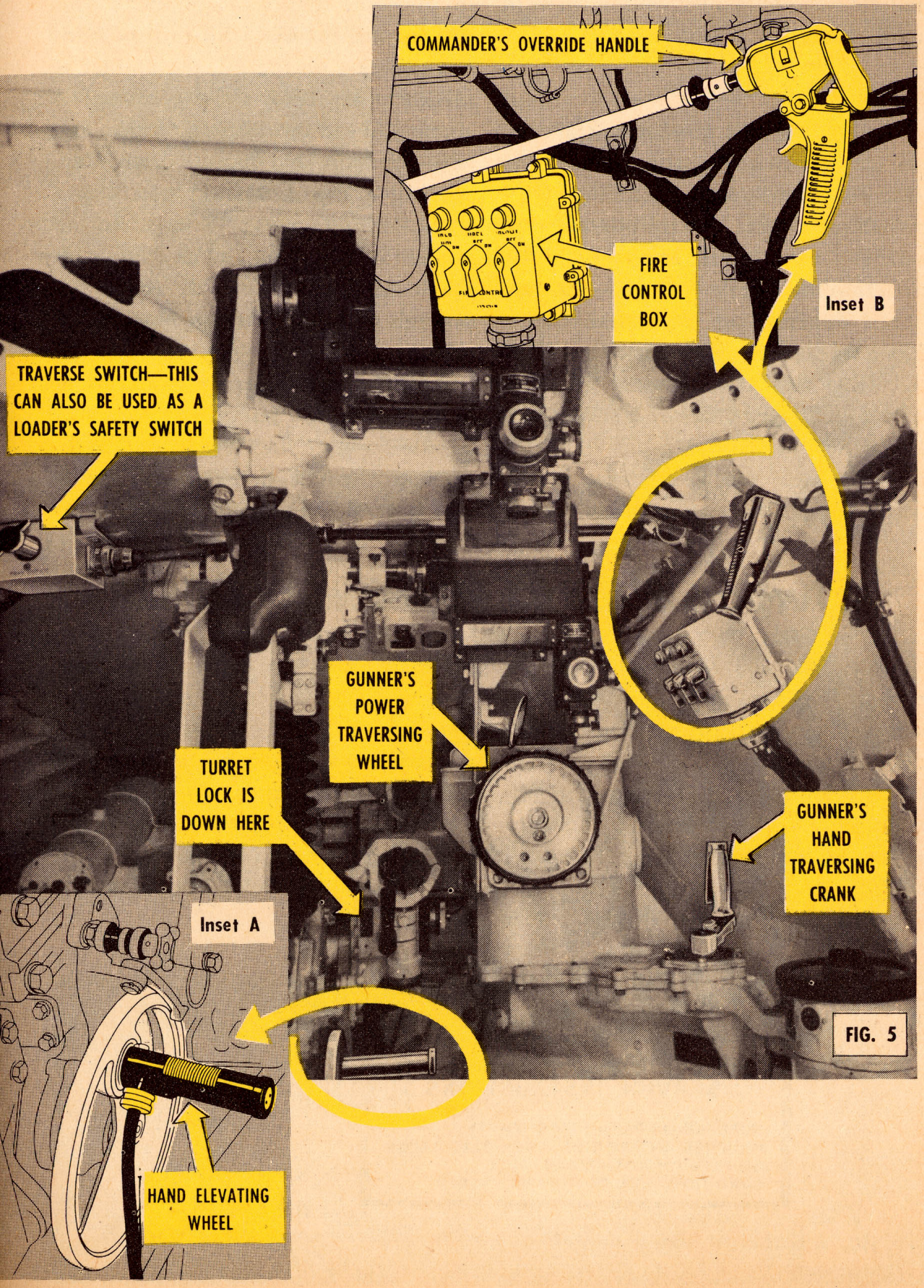

COMMANDER'S OVERRIDE HANDLE
FIRE CONTROL BOX
Inset B
TRAVERSE SWITCH—THIS CAN ALSO BE USED AS A LOADER'S SAFETY SWITCH
GUNNER'S POWER TRAVERSING WHEEL
TURRET LOCK IS DOWN HERE
GUNNER'S HAND TRAVERSING CRANK
Inset A
HAND ELEVATING WHEEL

FIG. 5

handle mounted on the ceiling forward of his hatch (Fig. 5—Inset B).

Here's how it works:

To override the gunner in traverse, the traverse switch must be on; to override in elevation, the ELEVATION switch on the fire control box must be on. The turret will traverse in the direction the handle is moved—traverse speed depends on the distance you move the handle. The mechanical linkage from this handle to the gunner's wheel is designed so the gunner will know he's being overridden—he will feel the force of the override in the action of his traverse wheel. On the E1, the override makes the gunner's controls powerless, but with this mechanical override on the E2, the gunner is instantly aware of the commander's action and can more readily follow the new situation. No more "dead-stick" feeling and momentary confusion about "wha' hoppen?" Even when the gunner is traversing or elevating with the hand crank, the commander can override in power without hurting the manual controls.

To override the gunner in elevation, or to elevate the gun, move the same handle forward to elevate and backward to depress. Commander's elevation control has one constant speed.

AUTOMATIC BLEED ON REPLENISHER CYLINDER

On tanks with Manufacturer's No. around 1500 and under, you'll need to keep an eye on your gun-replenisher-cylinder bleed-hole. It's located on the cylinder between the rear mounting-strap and the oil-service instructions, or where the oil-service instructions should be (Fig. 6).

This hole must be open at all times to let oil out when too much oil pressure develops. When it's plugged, surplus oil stays in the cylinder, causing excessive pressure and interfering with the gun recoil action. So watch it if you're swinging a paint brush in this vicinity and in case somebody else has painted over the hole, open it with a piece of wire.

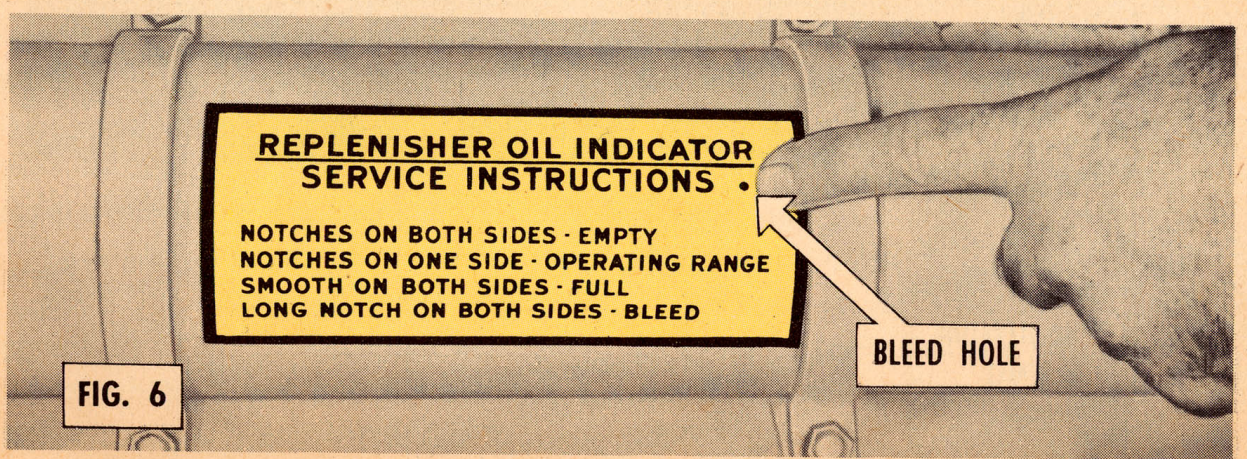


FIG. 6

REPLENISHER-CYLINDER INDICATOR-TAPE

This tape that's located at the rear of the replenisher is your guide as to how much oil is in your recoil system. Notches have been put on as markings so it can keep you posted even in the dark —just feel it and it'll tell you where you stand. That is, if you know what the notches mean. If your tank doesn't have an instruction plate on its replenisher cylinder, paste this dope on (Fig. 7) so you can be kept posted.

If you don't have enough oil, first remove the filler plug from the replenisher, and the nozzle from your filler gun. Fill the filler gun with OHA, screw the hose on the filler gun into the filler-plug hole loosely, push the plunger slightly to force the air out, screw the hose tight and force the fluid into the replenisher.

If you have too much fluid in the system, remove the filler plug on the replenisher. Hold a rag under the filler-plug hole and let the rag absorb the oil being drained. Push in on the ball valve in the filler-plug hole with the nozzle of the filler gun so the fluid will flow out of the replenisher, and use gradual pressure on the ball valve to control the amount of oil flow. On tanks with Manufacturer's Serial No. 1580 and up, a valve was added to the top of the replenisher cylinder. To bleed, just open the valve and catch the oil.

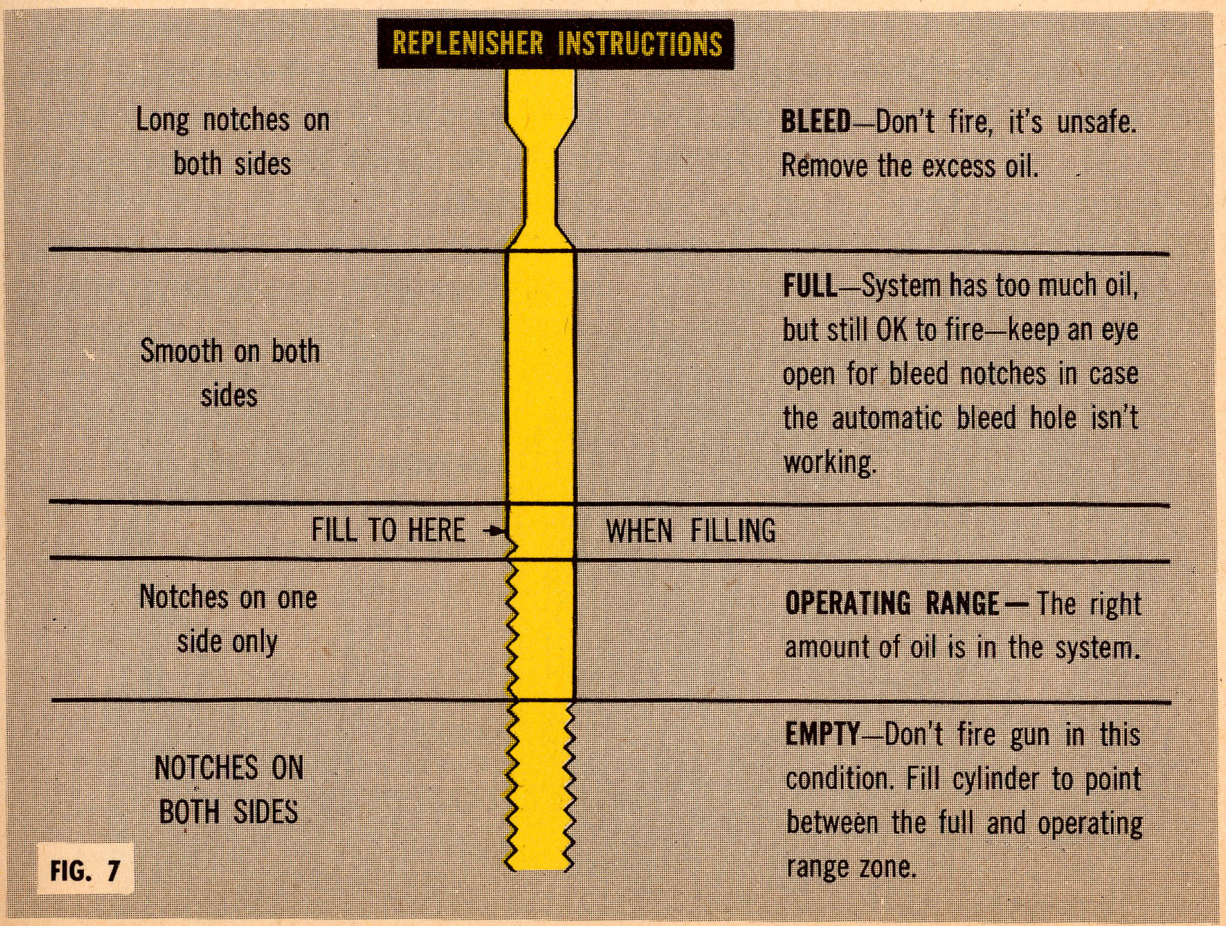


FIG. 7

Compression Fittings

It's a natural urge to take a wrench and tighten a fitting when you notice it's leaking—but keep your muscles off the tube fittings in the turret hydraulic system. These are not like gas-line fittings. These are compression-type fittings that you should pull up only ¼ turn past snug when you put 'em on. If you see one leaking, tighten it finger-tight and then no more than ¼ turn. If it still leaks, all the tightening in the world won't stop it—you'll need to make a new connection (if the tube's long enough) or replace the tube.

You can use the compression-type fitting over and over again without losing its sealing qualities if you'll only use it properly. Only it's seal (ferrule) should be replaced. If you've got to replace a piece of tube to stop a leak, first remove the old tubing and remove the fitting carefully. Then cut off the imbedded ferrule (if you're going to use the same piece of tubing).

Next, get a nipple part of a compression fitting and grip it in a smooth-jaw vise. This is a fixture to preset all your compression ferrules in the right place on the tubing. Keep in mind—the same nipple can be used as a fixture for presetting up to six sleeves, but then it should be used for a final assembly in the turret because more than six "settings" may distort the seat in the nipple.

Now place the nut and the ferrule on the tubing so that the shoulder end of the sleeve is facing the threaded end of the nut (Fig 8). Cut the tubing off square and remove all burrs.

Lubricate tubing and ferrule with light-weight oil. Next, slide the tube into the nipple (shoulder to the flange) and turn the nut finger-tight. Then press the tubing into the fitting firmly so that the ferrule and the nut-shoulder mate easily.

Tighten the nut with a wrench, but no more than 1¼ to 1½ turns. This'll

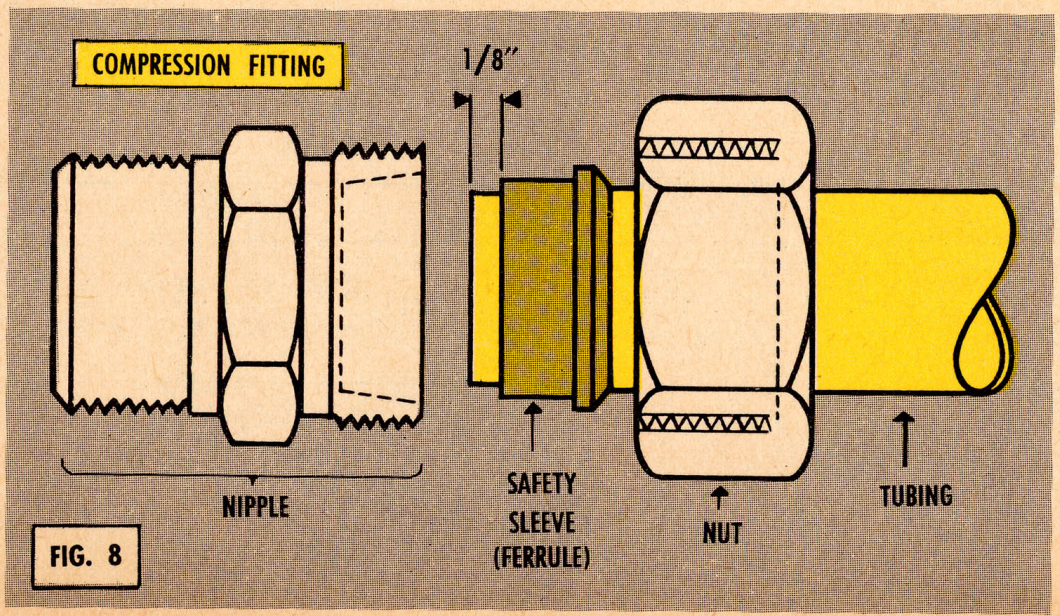


FIG. 8

preset the ferrule on the tubing. Then unscrew the nut, remove the tubing from the fitting, and check the ferrule's distance from end of tube. The distance should be approximately ⅛″, but not less than 1/16″ (Fig. 9). If it's on OK, it's ready to be put into the turret.

When screwing it onto the nipple in the tank, tighten the nut on the fitting only hand-tight. Then, using an open-end wrench, tighten the nut no more than an additional ¼ **turn.**

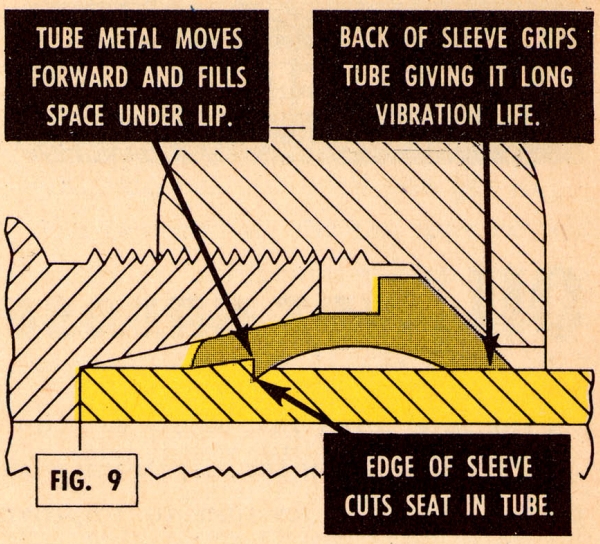


FIG. 9

HAND-FIRING HANDLE ON THE 76mm

One of the quirks on some of these tanks is that the hand-firing control-handle on the 76mm gun sticks in the FIRE position. It should always return to the OPEN position.

To stay on the safe side, before firing your piece check up on the handle and make sure it returns to OPEN as it should. If it has a tendency to stick, or if the cam doesn't clear the follower when in released position, you'll need to move the cam on the handle as shown in Fig. 10. Here's how to do it:

1. Remove the cap-screws that hold the control handle to the gun cradle and take off the handle.
2. Now remove the snap ring from the handle.
3. Next remove the cam from the handle serrations and move the cam two serrations (25°) clockwise (looking from the cam end) from its original position.
4. Put back the snap ring.
5. Position the handle on the gun cradle, put back the screws and tighten them to about 25 ft. lbs. torque.

When you've done all this, try the gun again and see if the handle works.

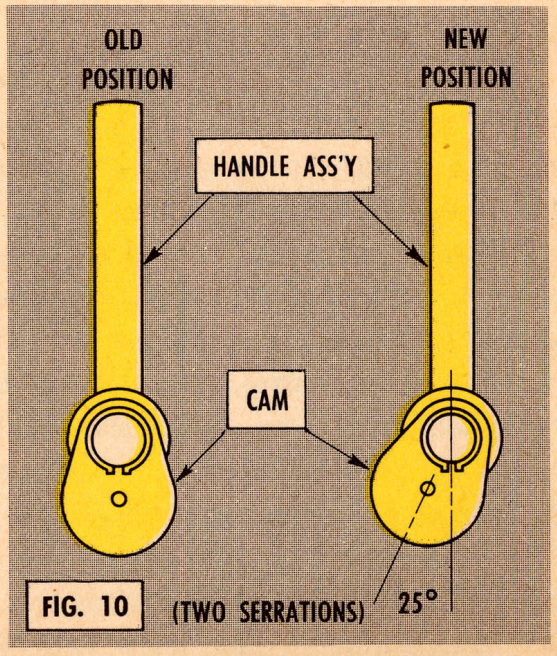


FIG. 10

SUSPENSION

OIL, NOT GREASE

The lube order in TM 9-730 (June 51) says to lube the suspension with grease . . . but a revision to improve the tank's suspension changed this. Beginning with Manufacturer's No. 101, all the suspension-bearing reservoirs and the suspension-housing mountings hold oil instead of grease. Plugs replaced the Zerk grease-fittings. The road-wheel hubs and support rollers are decorated with two plugs so that one plug is usually on top. Now, instead of poking around the suspension with your grease gun like the lube order says, you'll have to use a ¼" Allen wrench to remove the filler plugs and fill the cavities with OE.

On tanks with Manufacturer's No. 1113 and up, the Allen plugs were changed to hex-head plugs, so you'll need a wrench.

When pouring oil into the hubs, particularly the track-support-roller hubs, give the oil enough time to fill all the crevices because the clearances are close enough to cause some oil restriction. Each road wheel takes about 13 ounces. Compensating-wheel hub, compensating-lever and suspension-housing mountings each hold 10 ounces. The track-support-roller hubs take 4 ounces each.

The oil in these pockets should be checked every 500 miles to be sure it's kept at plug-hole level. In the double-plug hubs, always remove the plug that's on top for your check. If no oil comes out, rotate the wheel to get the plugs on a line horizontal with the ground. If oil still doesn't come out, rotate the wheel till the open plug is on top again and add OE till it runs out.

Know A Seep From A Drip

Cast your eye around the external areas of the bearings every so often and note the amount of oil seepage. If you see a little oil, it doesn't mean the seals need to be replaced. Here's a guide as to how much oil you can lose and still be on the safe side.

Run the tank a while, then stop and put a piece of paper under the leaky seals. Let it set for fifteen minutes. The puddle on the paper must not be bigger than 6" across (on concrete 6½") when you have it under the road wheels, suspension housings or compensating unit. And a puddle 3" across (concrete 3¼") under the track-support rollers. If your puddles are larger than that, the seals should be replaced.

If it's your tough luck to inherit one of these leaky oil seals, requisition your replacement seals and spacers by the numbers in ORD 7 SNL G251 and also by stating the tank's Manufacturer's Serial Number on your requisiton. You get the bad seal out of the assemblies with a drift and hammer after removing the assemblies.

To install these new face-type seals, the tools you'll need are listed on pages 662 and 663.

TRACK ADJUSTMENT

The track for the T41 is the 74-shoe T91E3 track—and for proper adjustment, the sag between the first and second track-support rollers should be ⅝″ to 1″.

It's checked this way: Drive forward, and coast to a stop without using the brakes. Then place a straight edge on the track and measure the sag midway between the rollers (Fig. 11).

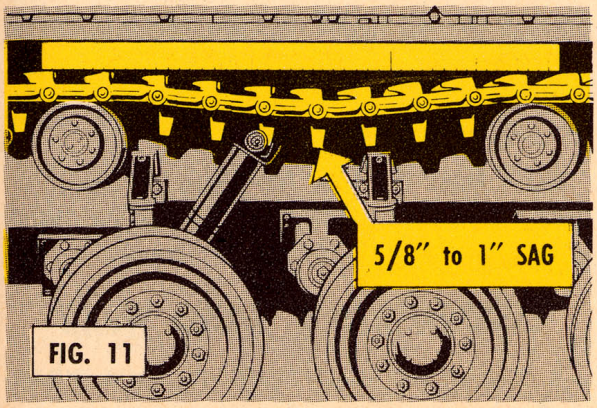


FIG. 11

If the sag is more than 1″, the track needs adjusting. Loosen the adjusting-nut stop (at this point, it's a good idea to clean the mud and dirt from the nut threads and give 'em a smear of grease), then turn the adjusting-nut either clockwise to tighten the track, or counter-clockwise to loosen the track. When you think it's about right, drive the tank forward, coast to a stop, and recheck the sag. Keep this up until you've got that ⅝″ to 1″ adjustment. After you've got it, place the nut stop back in its original position—make **sure** the locking plate is well seated against the adjusting screw—and tighten the bolt.

Now take a look at the clearance between the adjusting arm and the eyebolt (Fig. 12). It should be 0.010″ or more. If it isn't, the adjusting nut will work loose, get caught in the track, and all hell will break loose. This 0.010″ minimum clearance is a must—so keep tightening the nut until you get it.

On new tracks, the sag may be less than the ⅝″ minimum to keep that eyebolt from touching the adjusting arm. But running new tracks tight isn't harmful—they usually stretch to proper sag after a few miles of operation.

And in case you're wondering: Having more shoes in one track than the other will not affect the operation of the tank in any way as long as each track is adjusted right.

Another tip that'll keep the adjusting nut and eyebolt from being a could-be sore spot: Out in the elements (and you know Nature, boy) the nut and bolt get an urge to rust and stick, making track adjustments a bit difficult. So every time the track is broken, loosen the adjusting-nut stop, back off the nut and pack nut and threads with grease (Fig. 12). Take care not to fill the nut so full that the expansion plug gets pushed out when it's turned back on the eyebolt.

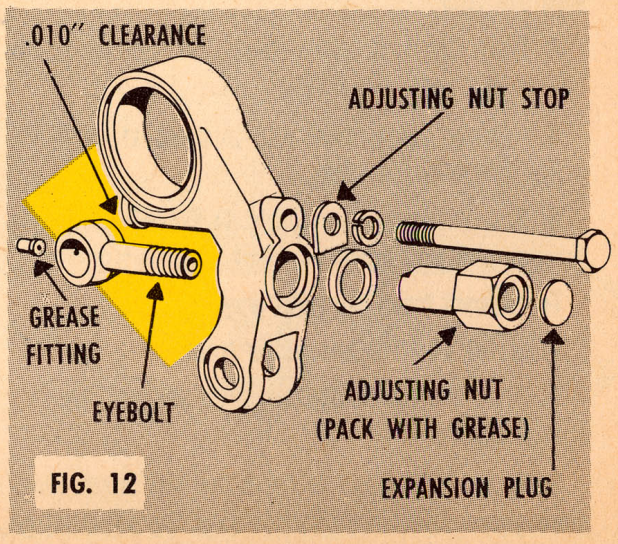


FIG. 12

TRACK PIN INSTALLATION

WHEN connecting track shoes, has ramming home the eight-sided wonder pin been trying your soul? Maybe you're using the wrong method, or the wrong track-jacks.

It's possible to install track shoes at several different angles because of their octagon-shaped bushings. Only one angle is correct . . . the one shown in Fig. 13. And this angle is necessary to keep stresses and wear to a minimum—it also cuts down hard work when you connect and disconnect the track.

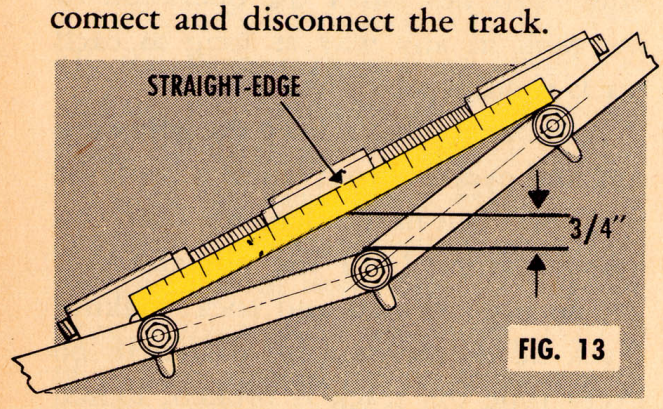


FIG. 13

This is the best way to disconnect the track:

1. Release track tension.

2. Install two track-jacks (Fixture 41-F-2995-165) to the **inside** of the track, between the compensating and front road-wheels.

3. Now rest a straight edge on the shoes alongside the jack.

4. Draw track together until the center of the "V" is ¾" from the straight edge (Fig. 13).

5. Remove safety nuts and washers at each end of the pin between jacks.

6. Screw adapter of puller 41-P-2957-33 on pin threads and pull pin from track.

To connect track the right way:

1. Install two track-jacks to tracks.

2. Draw the track together until you get the ¾" measurement.

3. You're now ready to drive the hex connecting-pin in place. There are five bushings the pin must go through. Use a 12" crescent wrench to rotate and aline the pin as you come to each bushing . . . the old "use a bigger hammer" idea will ruin one or two shoes as well as a pin. As the pin is driven in and touches the next bushing, rotate the pin with the wrench, get it lined up with bushing, then tap it **lightly** with the puller or hammer.

4. Tighten pin nuts to 160-200 ft-lbs torque. (Always tighten pin nuts before removing jacks.)

5. Remove track-jacks and adjust track for ⅝" to 1" sag between front and center track-support rollers. Incidentally, track jack 41-F-2995-165 is a new fixture. It's different than the one shown in TM 9-730. If you're carrying around any other type than what's mentioned here, requisition a new set. Until you get your new set, use track-jack 41-F-2995-55—it's the one used on the M26.

Note: After the first few miles of operation, tighten pin nuts to at least 160 ft-lbs torque. This'll avoid frozen pins.

COMPENSATING WHEEL WEAR

Another preventive chore done while the track's off is switching the compensating-wheel discs. The track's center guides chafe the outer-disc guide-flange and make it wear more rapidly than the inner-disc flange (Fig. 14). And any distortion of the compensating wheel or linkage will cock the wheel, increasing the wear on the outer disc.

To get the most use out of the compensating wheel, it's smart to equalize this wear. Put "inner" disc on "outer" side, and vice versa, every 1000 miles.

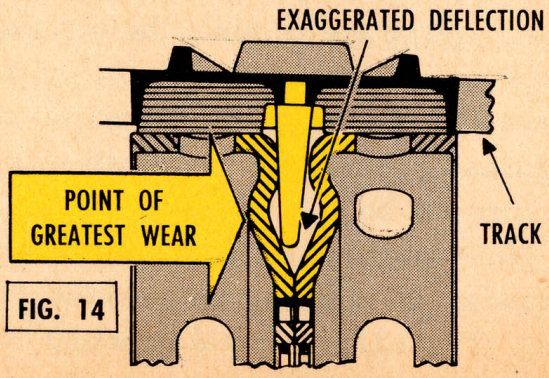


FIG. 14

TORSION BARS and ANCHORS

When replacing a broken torsion bar, the mating anchor should always be replaced because the bar and anchor often take each other's shape while they're mated. For this reason, the serrations on a new torsion bar won't always mate properly with those of the used anchor. Also, the anchor is usually damaged some, even though you may not see it.

Torsion bars are marked with an arrow and a part number for identification. Plus, to cut down backaches, the bars are now also being marked with a dab of color on the outer ends (Fig. 15).

To quote a gentlemen in the 3rd Cavalry: "You don't have to bust a gut to install a torsion bar. Some guys don't change the anchor and don't index the blank space on the bar with the square tooth in the anchor, then they wonder why it takes umpteen whacks with a 10 lb. sledge to ram her home."

He goes on to inform us, "Here's the easiest and also the correct way. First, replace the anchor and keep its plate loose. This'll allow for any misalinement of the support mountings.

"Next, make sure you've got the right bar, then grease the serrations at each end and shove the bar thru the support-arm opening and into the tank. Turn the bar so the inner serration's blank tooth is on top (12 o'clock) and lines up with the anchor's block tooth. Push the bar lightly until these serrations just meet.

"Now raise the support arm until its block tooth lines up with the bar's outer serration's blank tooth. When they're alined, the bar should slip home and seat itself with a push of the hand. If you're a little weak on the push, tap the bar lightly with a piece of wood. When the bar's in place, keep the suspension arm supported until the cap and retaining bolts are installed.

"When handling bars avoid scarring them—scratches and burrs cause 'stress concentrations' which in turn cause premature failures, which in turn means more work."

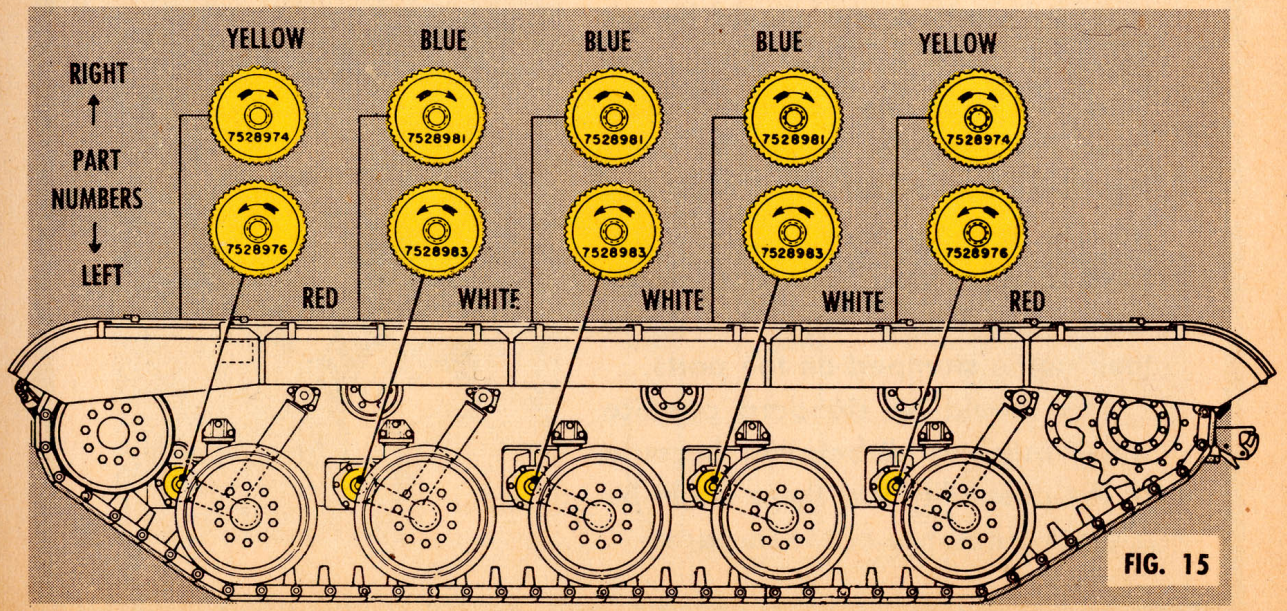


FIG. 15

Wheel Bearing Adjustment

There's been a change in the bearing adjustment as it was originally given in TM 9-730 (June 51). Here are the new specifications, by the numbers.

With a torque wrench:

1. Raise wheel off ground.
2. Remove hub cap, gasket, static spring and cotter pin.
3. Tighten the nut to 200 ft-lbs torque.
4. Back off nut to zero.
5. Tighten the nut to 75 ft-lbs torque, if parts are old—90 ft-lbs, if new.
6. If you stop at the pin hole—pin it; if not, back off to nearest cotter-pin hole.
7. Insert cotter pin, static spring, gasket and hub cap.

Without a torque wrench:

1. Tighten nut good and tight.
2. Back off nut till wheel spins freely.
3. Spin wheel and tighten nut till wheel drags slightly.
4. Locate cotter-pin hole, then back off nut till hole is clear.
5. Insert cotter pin, static spring, gasket and hub cap.

Speaking of a torque wrench . . . you'll get accurate torque readings only from free-running, lubricated threads. If threads are gummed, buggered, or rusted, your reading can be as much as 100% wrong—and usually is. Clean and oil the threads.

pairing-up bearing cones and cups

You can get a failure in road wheels, final drives, track support rollers, road-wheel-support, and compensating wheels when bearing cones and cups are not checked to be sure they pair up (Fig. 16).

For best service, bearing-cone-and-cup combinations should be put together from bearing cones and cups made by the same manufacturer. For example, use Hyatt bearing-cones with Hyatt cups, New Departure bearing-cones with New Departure cups, and Timken bearing-cones with Timken cups. You'll see their name stamped on the parts.

This should be standard practice when installing all bearings because of the possibility that there might be a slight difference between parts.

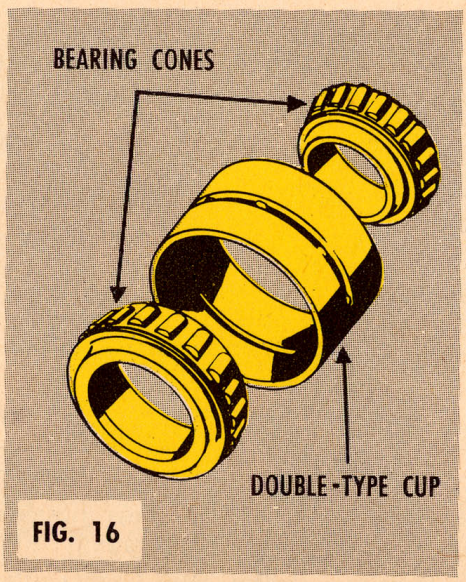


FIG. 16

REPLACING ROAD WHEELS

When using wheel lifter (41-L-1390-205):

1. Loosen, but don't remove, the wheel nuts.

2. Install the lifter with lower fork-end facing the front of the tank and upper end snug against the road-wheel-support arm.

3. Drive the tank forward slowly. Both ends must engage properly. Stop tank when lifter is vertical. **Caution:** Make sure you and everyone else are clear of the lifter—if both ends aren't engaged properly, the thing will come flying out from under like a bat out of Hades.

4. Now take off the hub nuts and remove the wheel.

5. Put on the replacement wheel, install the nuts but **don't tighten.**

6. Drive tank backwards until it's free of the lifter. Now tighten the hub nuts to 250-300 ft-lbs torque. (If a torque wrench isn't available, tighten the nuts till they're good and tight, back off about two turns, then retighten.)

When wheel lifter isn't available:

1. Get yourself a piece of 2x4 about a foot long.

2. Place it next to the inner edge of the track, under the support arm of the wheel to be removed.

3. Place a completely lowered hydraulic-jack on the 2x4 so it'll be in the center of the arm when wheels are up.

4. From here on, do like you'd do if you'd had a lifter to begin with.

sensitive track-static-wires

THE T41's track has a 14-gage static-grounding wire in each track bushing to ground the track pin. This prevents radio interference caused by track static-electricity (Fig. 17).

If you do any electric welding on the tank, avoid using the track for the ground connection—electric welding often involves current as high as 150 amperes which will burn out 14-gage, 0.033″ diameter wire. And when doing any welding on the turret, never connect your ground to the hull—this would cause arcing of current thru the turret race and supporting ball-bearings.

Find yourself some unpainted surface as close as possible to the area being welded, and make your ground connection there. But **please** don't use the track.

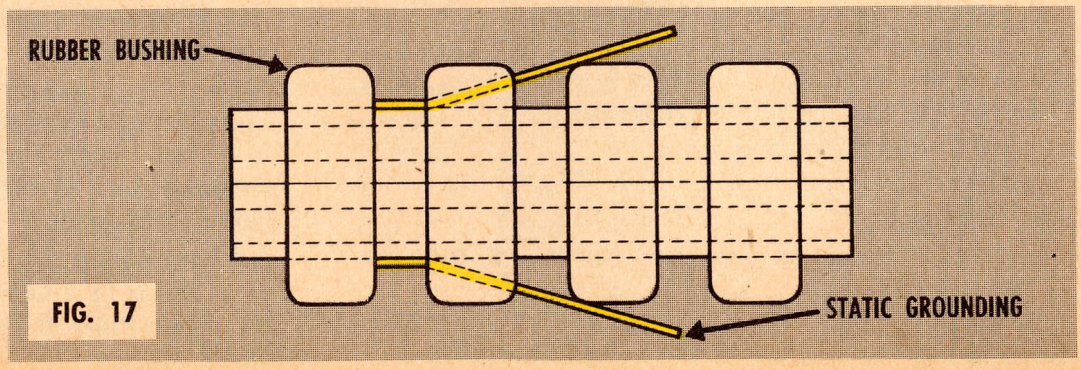
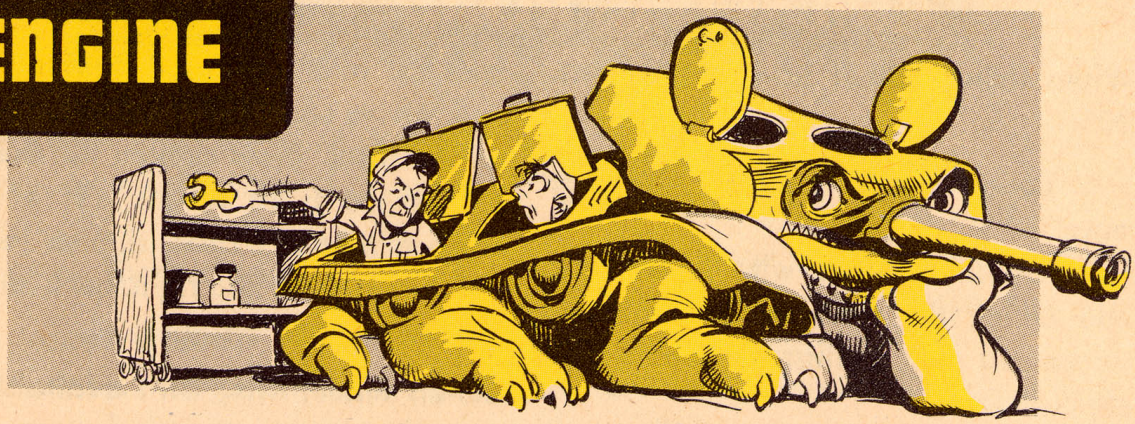


FIG. 17

ENGINE



continental AOS-895-3 engine data

TABULATED DATA

1. Horsepower at rated speed (2800-rpm)....500 BHP
2. Engine governed speed—full load....2800-2840-rpm
3. Engine governed speed—no load.....2950-rpm
4. Engine idle speeds (see page 622).....650-rpm
5. Number of cylinders 6
6. Cylinder cooling .....Air
7. Crankshaft rotation—viewed from accessory end .....Clockwise
8. Camshaft rotation—viewed from accessory end.....Counter-clockwise
9. Numbering of cylinders from accessory end
   Right Side (Tank's left side).....1-3-5
   Left Side (Tank's right side).....2-4-6
10. Firing order 1-6-3-2-5-4
11. Valve clearance—(cold engine)
    Intake ..... 007″
    Exhaust..... .020″ (.014″ under rocker roller)
12. Spark plug gap..... .011″-.014″
13. Oil capacity .....11 gallons
14. Oil pressure at 2800-rpm (full load)
    SAE 50 oil 180° F.....60 to 70 psi
    SAE 10 oil 180° F.....40 psi minimum
15. Oil pressure at idle
    SAE 50 oil 180° F.....30 to 35 psi
    SAE 10 oil 180° F.....15 psi minimum
16. Maximum oil temperature into engine (warning unit) .....225° F
17. Normal oil temperature.....180 to 185° F
18. Oil specifications (ambient air temperature)
    + 30° F to + 125° F .....SAE 50
    0° F to 40° F .....SAE 10
    — 70° F to 0° F .....Arctic
19. Oil consumption-maximum at 2800-rpm full load .....7.5 qts. per hour
    (SAE 50 oil) new engine.....3.5 qts. per hour
20. Fuel specification—regular (MIL-G-3056) .....80 Octane
21. Normal cylinder compression at cranking speed.....70 to 85 psi
22. Warm-up speed 1000-1100-rpm

OPERATING LIMITS

DESCRIPTION	REMARKS
1. Oil pressure control valve	Controls oil flow to maintain pressure of 70 to 80 psi using SAE 50 oil at 180° F.
2. Oil filter by-pass valve	Valve opens and allows oil to by-pass oil filter at a differential pressure of 50 psi.
3. Spring balanced oil cooler by-pass valve	Valve opens and allows oil to by-pass oil cooler at a differential pressure of 50 psi.
4. Thermostatic oil cooler by-pass valve	Valve closes at 185° F and forces oil to pass thru oil cooler. Valve opens and allows oil to by-pass oil cooler at a differential pressure of 60 psi.
5. Vacuum heat control valve unit	Controls flow of exhaust gases passing through hot spot manifold to preheat carbureted mixture. Preheating ceases at 147° ambient air temperature.
6. Fuel pump	Fuel Pump Pressure: 3½ to 6½ psi at 1400 to 2800 engine RPM. Fuel pump vacuum: 10″ of mercury @ 700-rpm.

Check Cylinder Compression

If the engine operation is not normal, check the compression pressures this way:

1. Try to start the engine. If it starts, run it for 15 minutes, at 1000-rpm, with transmission in NEUTRAL, to distribute oil throughout the engine. Then stop the engine. If it won't start, try step 2.

2. Remove one spark plug from each cylinder. If the engine has **not** run as in (1) above, squirt a small amount of engine oil into the spark plug holes to wet the rings.

3. Start the auxiliary engine—to keep the batteries up, crank engine with starter motor (normal cranking speed is about 50-rpm with a fully charged battery) with compression gage on each cylinder in turn until you get a reading. Then repeat on the first cylinder tested to cut down the chance of a fluke. **Note:** Let starter cool for 5 minutes after each 30 seconds of continuous operation.

Normal compression pressure should be from 70 to 85 psi. If any cylinder is more than 5 lbs lower than the average, it means worn piston rings, worn cylinders, damaged pistons, poorly seated or poorly timed valves.

ENGINE-COOLING-FAN HOUSING

People are inclined to use the main-engine-cooling-fan housing and air-outlet vanes as a step or platform during service operations. This'll damage the fan, fan shaft, or clutch and restrict air circulation. The housing and vanes are to protect the fan from foreign matter (twigs, leaves, rocks, etc.) and to increase fan efficiency. They won't do either if they get beat up.

So pass the word along, and maybe even paint NO STEP on the center of the housing as a reminder (Fig. 18).

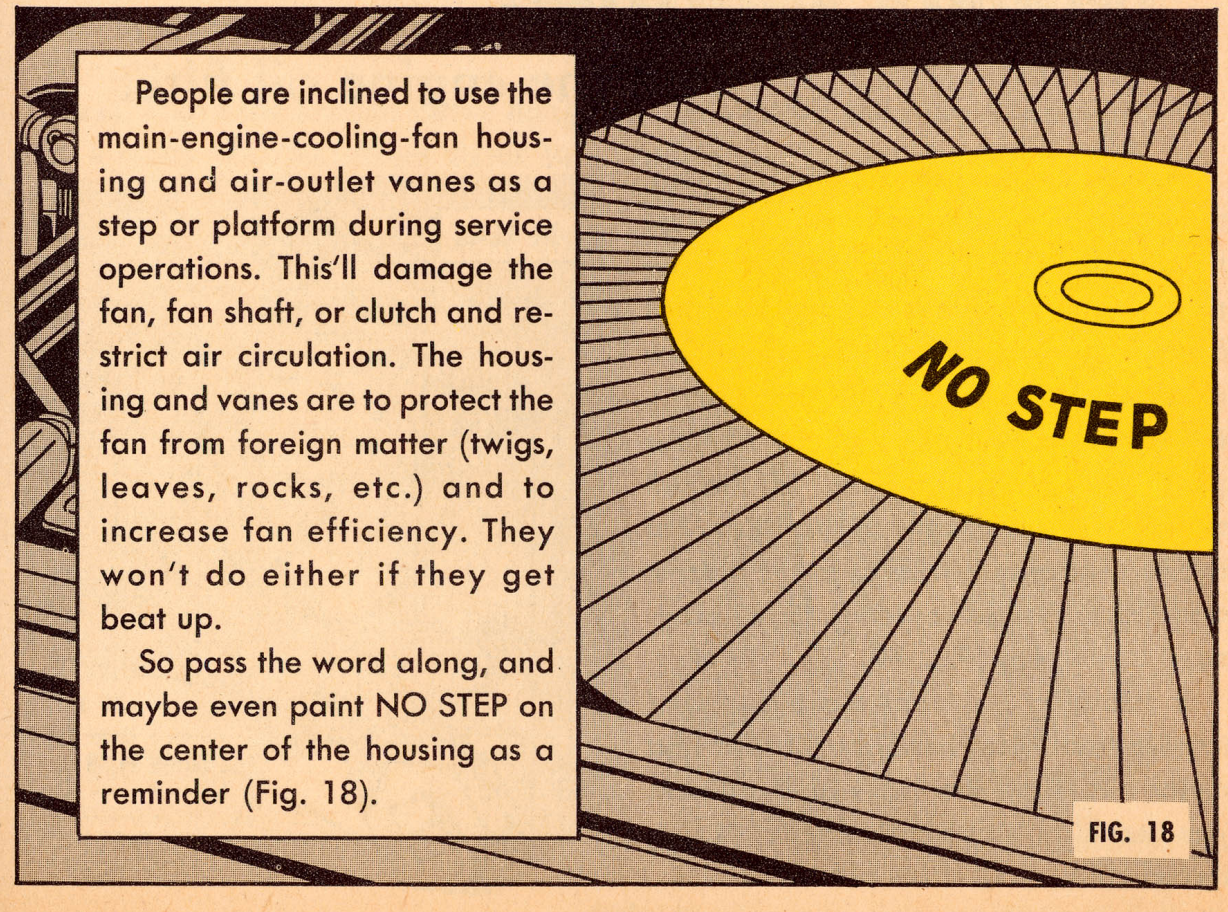


FIG. 18

FUEL-FILTER CARE

A plugged fuel-filter element will reduce gas flow to the carburetors, thus lowering the gas level in the carburetors' float bowls. This starves the engine and leaves an explosive mixture in the bowls; should the engine backfire as the gas mixture leans out, it would backfire into the floatbowl and squash the floats.

This is why it's a good idea to drain the fuel filter before taking the tank out for a spin. Skip this little chore and one day you'll be late to your own beer party.

Drain the filter by working thru the engine-compartment door from the fighting compartment. Drain about one pint of gas to wash out all the gook in the filter bowl. As for the gas, drain it into a can or some sort of container. It's bad business to let gas flood into the engine-compartment bilge. And who's interested in a fire?

If gas is accidentally spilled into the bilge when draining the fuel filter or filling the gas tanks or what-ever, don't operate the bilge pump unless your right exhaust muffler is cool. The pump's outlet is right next to this muffler; and if the muffler's near operating temperature, you'll ignite the spilled gasoline.

When and how to drain the fuel filter is one thing—cleaning it is another. The filter should be disassembled and cleaned weekly, like it says in your TM.

TROUBLE SHOOTING
with the engine oil filter

Besides keeping the engine oil clean, the filter can be used as an aid in engine trouble-shooting. If you suspect your main engine trouble is due to some part breaking down within the engine (like a bearing, oil pump, piston rings, etc.), the first place to look is at the oil-filter plug. Any metal particles in the oil stream will get caught in the filter, but the heavier ones will settle to the bottom and attach themselves to the filter's magnetic drain-plug (Fig. 19).

If the plug is clean, replace it and troubleshoot elsewhere—but if you find metal bits, from the looks of the pieces you should have an idea what's causing the trouble.

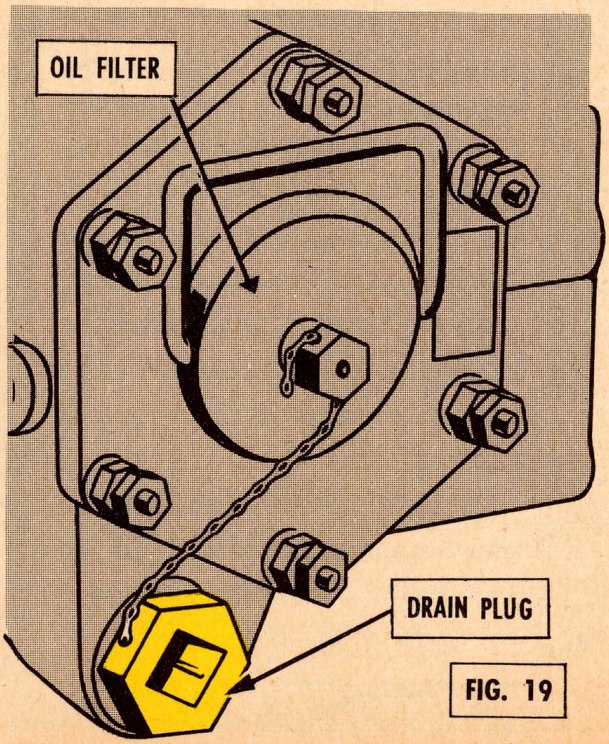


FIG. 19

filter-disc cleaner

Here's a gismo that takes all the effort out of cleaning the air-maze filter discs in your engine and transmission oil-cleaner. (Courtesy of on-the-ball inventor at APG, Maryland.) A lot of time and elbow-grease go down the drain cleaning the discs the old way because sometimes they don't come clean.

Have Ordnance or somebody make you the cleaning gadget shown below . . . just follow these instructions;

First, get a 4″ piece of 1¼″ OD steel tubing, a 1¼″ Ermeto fitting sleeve (H006-0354230), a 5/16″ SAE bolt and a 1¼″ ID bushing about 1½″ long. Take the Ermeto sleeve and slip it on the 4″ piece of tubing, with the flange upward; weld it 1½″ from the tube's top.

Next, above the Ermeto sleeve flange drill a series of 3/32″ holes about ¼″ apart all the way around the tubing. Then 1″ under the Ermeto sleeve drill a ⅛″ hole. Now you seal both ends of the 4″ pipe by welding a 1¼″ circular piece of metal on them. Take the 5/16″ bolt, insert it in a vise and drill a hole through its center, lengthwise. This bolt will be your air-nipple, it fits the Devilbiss-type DGA air-nozzle. If your outfit doesn't have this nozzle, then you'll have to improvise a nipple that will fit the air-hose you have. Weld the nipple to the ⅛″ hole in the tube. The last step: Champfer one end of the 1¼″ ID bushing (Fig. 20).

To use this cleaning fixture, remove a dirty disc from the dirty filter and place it on the tube so it'll rest on the Ermeto sleeve, slip the bushing on after it (champfer-end down), then attach your air-hose. With a light air-pressure blowing thru the disc, scrub it with a stiff-bristle brush saturated with cleaning solvent. Clean one disc at a time in this manner (Fig. 21).

Don't soak the dirty discs in solvent before putting on the fixture, this lets the outside dirt get inside and makes the job tougher and sometimes impossible.

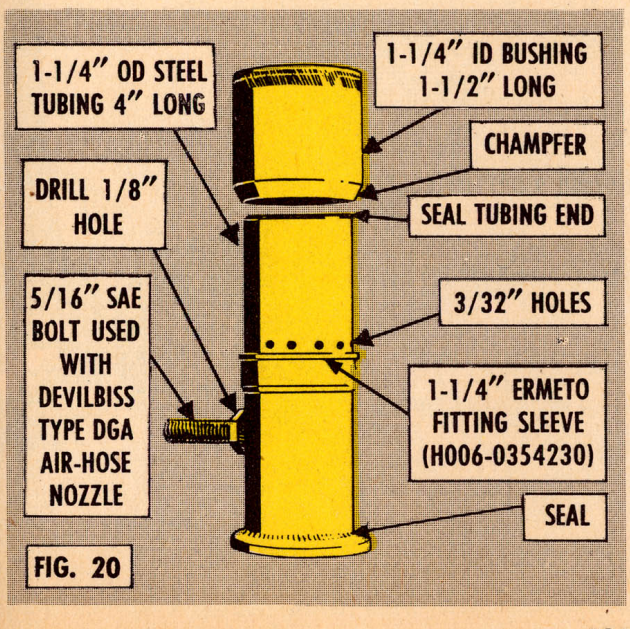


FIG. 20

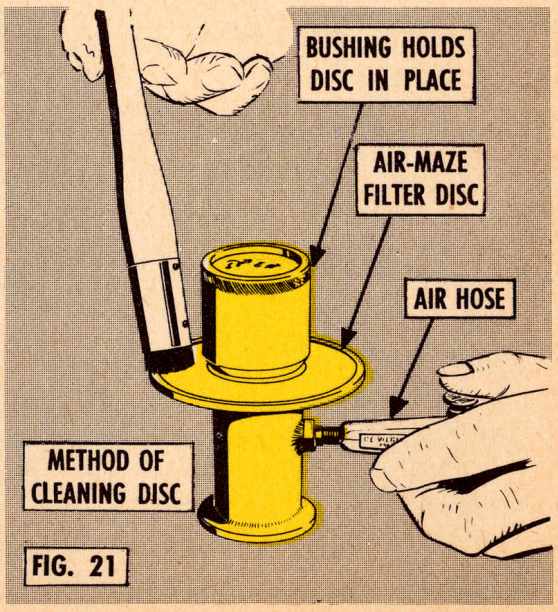


FIG. 21

main-engine-carburetor idling-speed adjustment

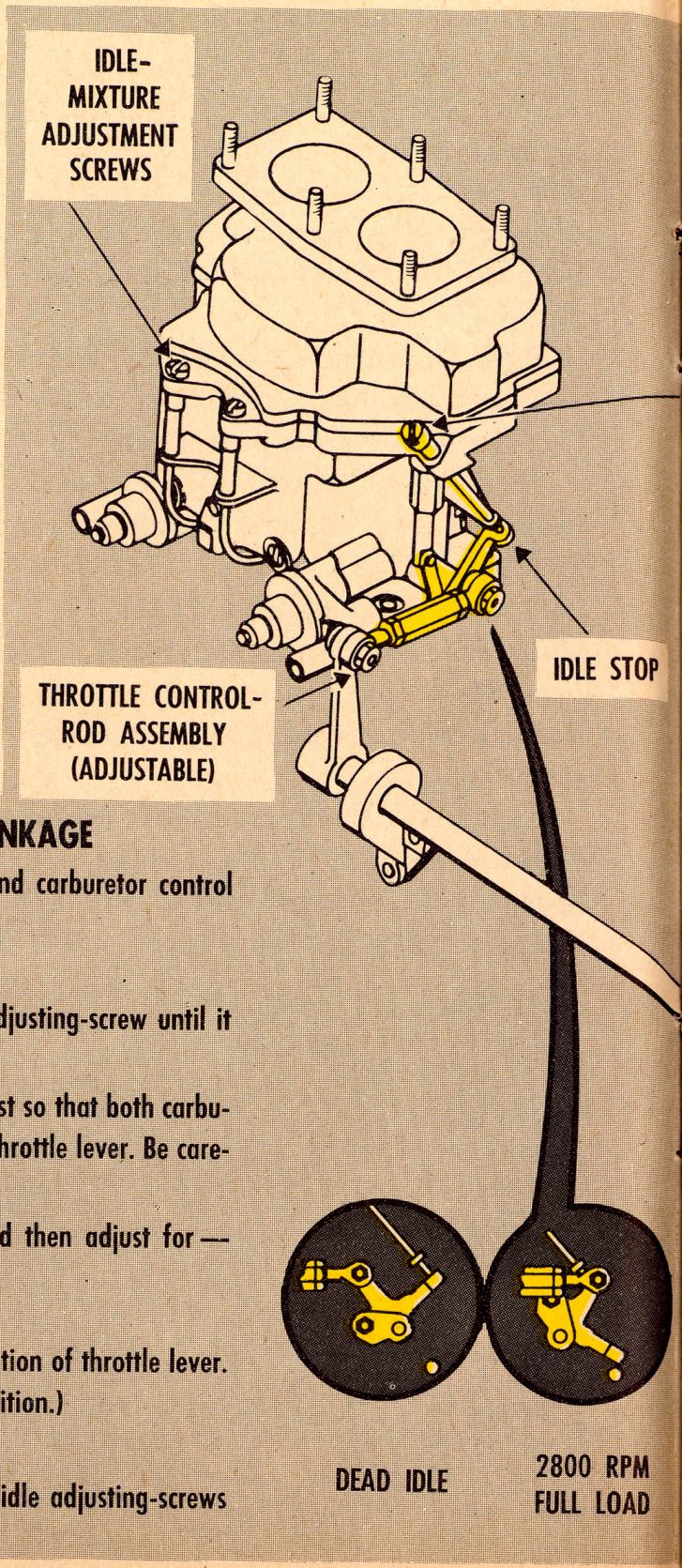
TO GET a uniform main-engine idling-speed, fuel-air mixture, and carburetor and governor linkage setting, it's important to make accurate speed adjustments on the two main-engine carburetors. Beforehand, make sure:

1. The throttle-valve plates of both carburetors must be in exact synchronism with each other at idle 650-rpm and low throttle positions.

2. The carburetor-throttle-valve-shaft levers, governor rocker-arm and throttle lever must contact their respective stops simultaneously at wide open throttle.

If you can't get rid of all mismatch in throttle-valve-plate positions, adjust it to occur at wide open throttle-position and **not at idle position.**

Keeping these two basic requirements in mind, here is the proper throttle linkage adjustment:



HOW TO ADJUST THROTTLE LINKAGE

1. Disconnect throttle control-rod-assemblies (2) and carburetor control shaft to governor rod.
2. Back out idle-speed adjusting-screws.
3. Close butterfly valve, and screw in idle-speed adjusting-screw until it contacts idle stop.
4. Connect throttle-control-rod assemblies, and adjust so that both carburetors close fully. Also check wide open position of throttle lever. Be careful to note position of vehicle control lever.
5. Connect carburetor control-shaft to governor rod then adjust for —
   - A. Closed position of throttle levers.
   - B. Wide open position of throttle lever.
   - C. Depress governor piston fully, and note position of throttle lever. (Throttle lever must be in nearly closed position.)
6. Tighten all jam nuts.
7. Start engine and adjust idle-mixture screws. Set idle adjusting-screws for desired idle speed.

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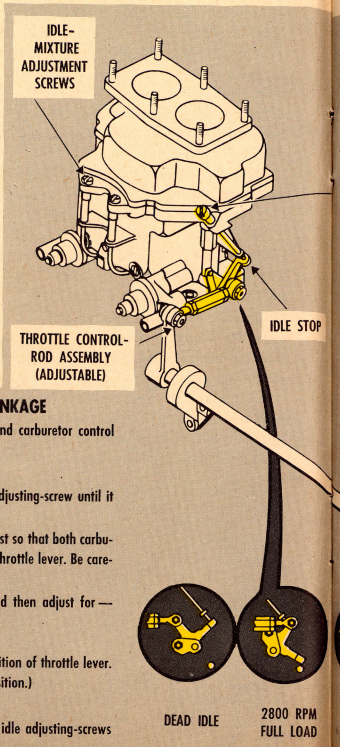
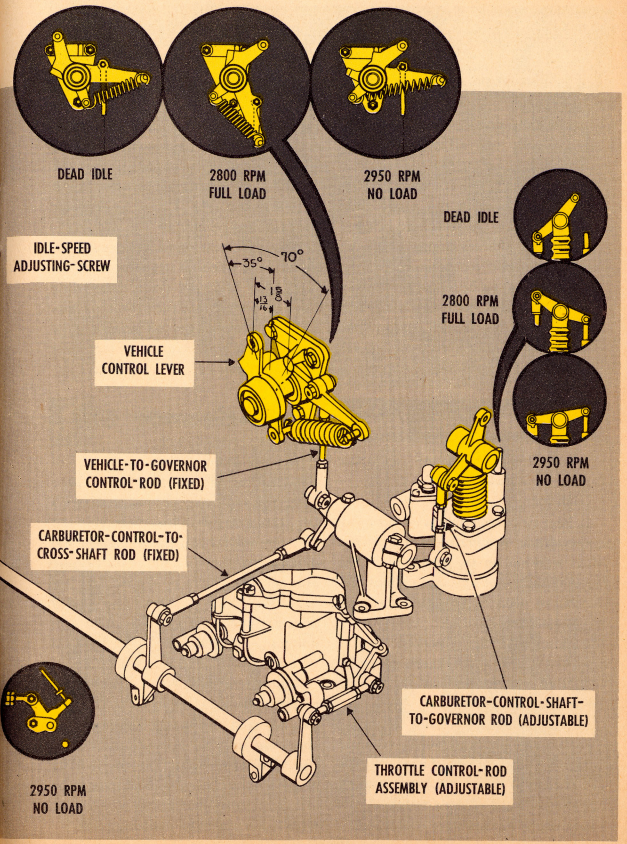
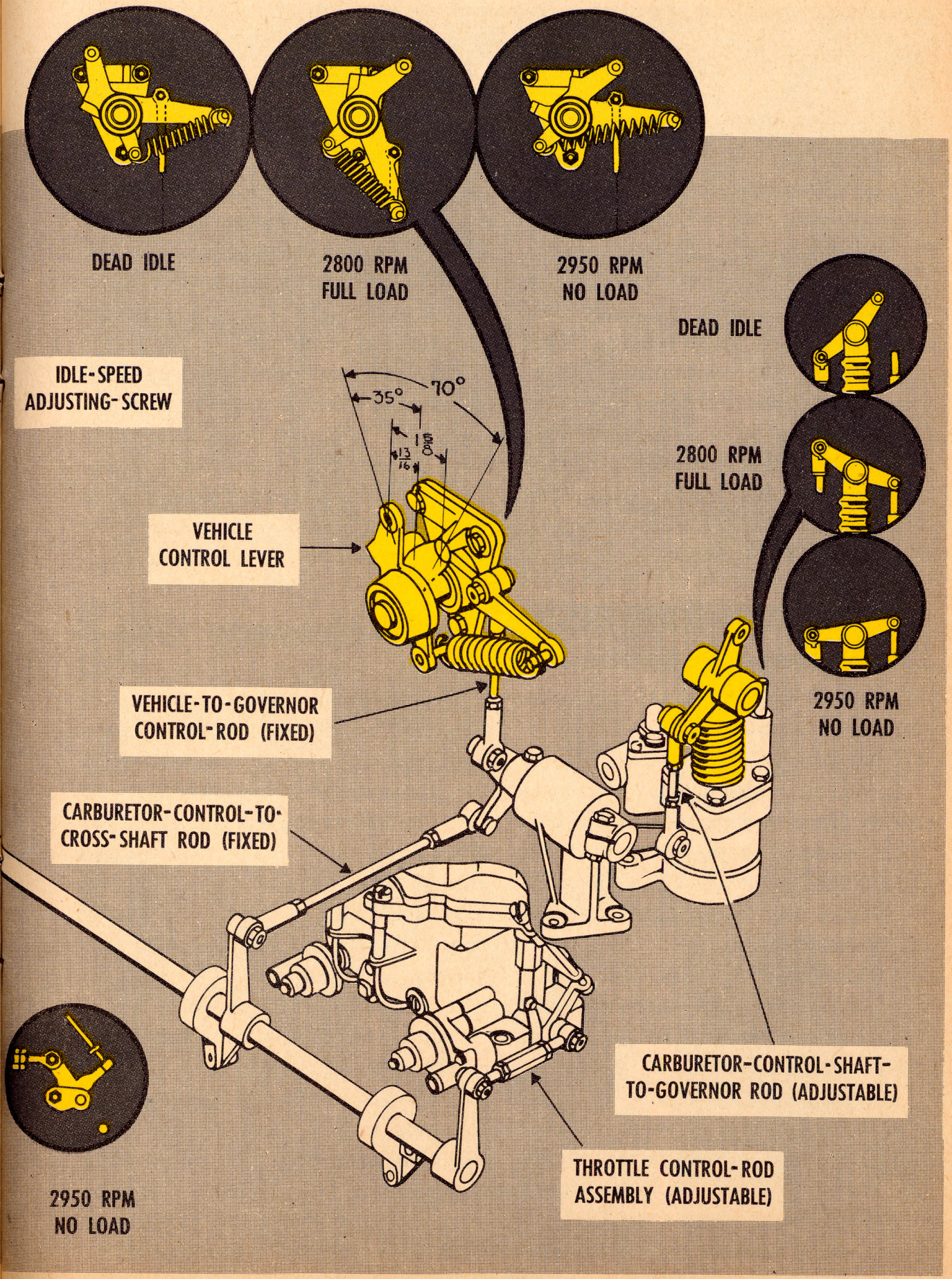





DEAD IDLE
2800 RPM
FULL LOAD
2950 RPM
NO LOAD
IDLE-SPEED
ADJUSTING-SCREW
35°
70°
1 3/8
13/16
VEHICLE
CONTROL LEVER
VEHICLE-TO-GOVERNOR
CONTROL-ROD (FIXED)
CARBURETOR-CONTROL-TO-
CROSS-SHAFT ROD (FIXED)
DEAD IDLE
2800 RPM
FULL LOAD
2950 RPM
NO LOAD
CARBURETOR-CONTROL-SHAFT-
TO-GOVERNOR ROD (ADJUSTABLE)
THROTTLE CONTROL-ROD
ASSEMBLY (ADJUSTABLE)
2950 RPM
NO LOAD

know your

OIL WEIGHTS and TEMPERATURES

Instructions given in the TM and LO state correctly that oil used in T41E1 engine should be OE 50 for temperatures above +32° F. For temperatures below +32° F or in the range from +40° to −10° F, OE 10 should be used.

Pay close attention to the 8° overlap between the two temperature ranges. Oil changes should be figured according to the **expected temperature,** and changes from OE 50 to OE 10 should be made as soon as the outdoor air reaches +32° F. This is to assure having a lighter weight oil in the engine whenever the mercury drops below +32° F. It's not necessary to switch back to OE 50 unless the **expected temperature** will be in the +32° F to +40° F range for extended periods.

Above all, never start an engine with OE 50 in it when its temperature is below +32° F. If you do, it'll be ready to go no place but to the overhaul shop. The fifty-weight oil can't possibly flow through the works in time to prevent scuffing of many friction surfaces.

air-cleaner-hose leaks

Engines'll last longer and run better if their air is dust free.

Look for:

1. Bent air-cleaner outlets—from using a screwdriver or other tools as a pry-bar when working on the hoses. Once the outlet's bent out of round, it's almost impossible to make it air tight. Best cure is to replace the outlet.

2. Hoses incorrectly installed. To seal tight—equally space the carburetor inlet and cleaner outlet and set the clamps behind their beaded edge.

3. Hose clamps not tight.

4. Pin holes in the hoses; believed caused by wear or interfering objects. The trick is to keep from being drafted into the nut-ward—keep a watchful paw handy where air hoses are concerned.

air-cleaner oil

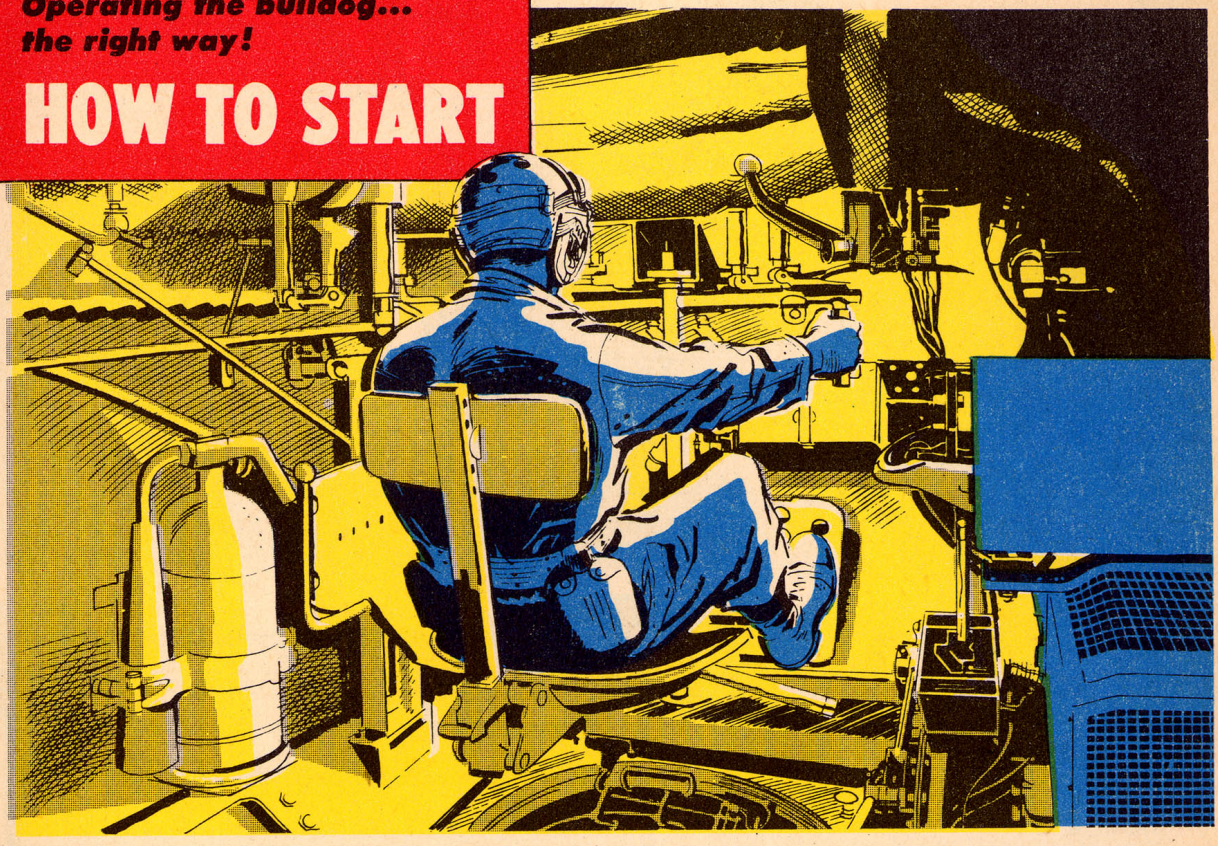
The preliminary Lube Order 9-730 tells you to inspect air-cleaner pans daily and replenish to bead level with OE, crankcase grade. But it's been found that the heavier oils get too heavy too quick when there's a lot of dust flying around.

Now it's SOP to inspect and fill the pans daily with OE 10 in temperatures down to −10° F. Below −10° F, use OES (Arctic). Make a note on your LO.

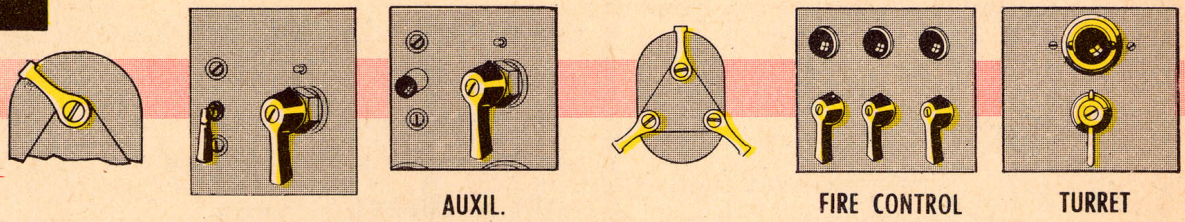
When reinstalling the cleaner's oil pan after an oil change, make sure the pan is seated all the way home and the clamping ring has a snug hold on the pan. And after tightening the locking screw for the clamping ring, it's a good idea to secure the screw with safety wire to keep it from working loose.

Operating the bulldog... the right way!

HOW TO START

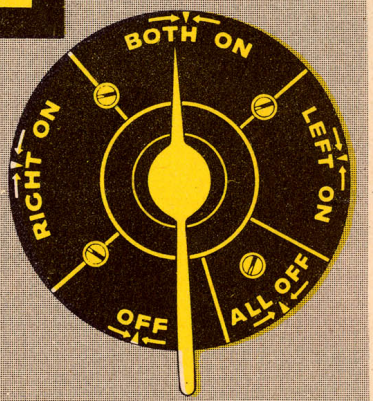


1 Be sure radio switch is **off** . . . and all other accessories are off at their source.



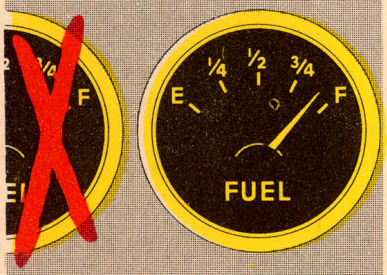
MAGNETO | PERSONNEL HEATER | AUXIL. ENG. SWITCH | LIGHTS | FIRE CONTROL SWITCHES | TURRET TRAVERSE SWITCH

2



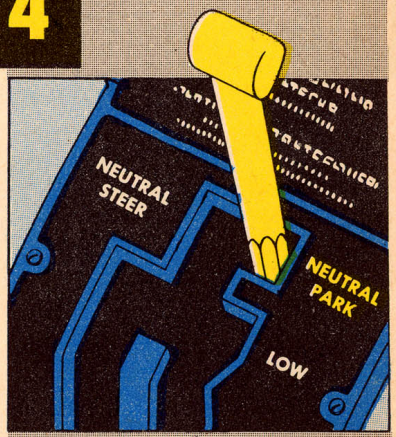
Fuel shut-off valves should be at BOTH ON.

3



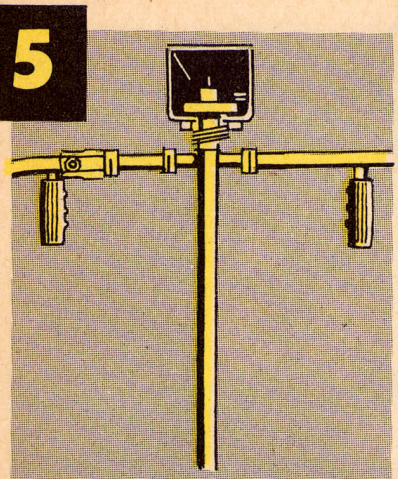
Got gas??
Check right hand gage.

4



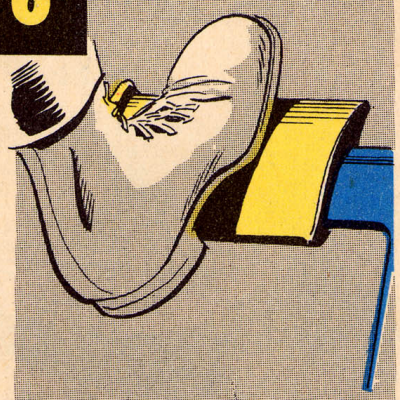
Shift into NEUTRAL PARK.

5



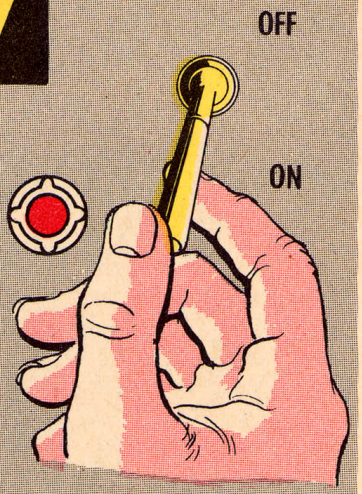
Steering bar must be in NEUTRAL.

6



Set parking brake . . . by pushing foot brake down.

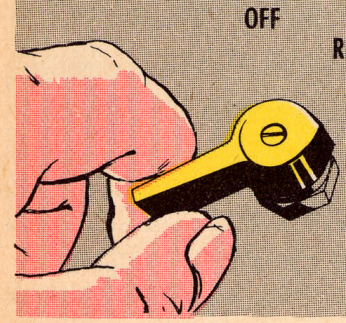
7



Turn on master switch.

8

If tank has been setting for more than 48 hours or in temperatures below freezing start Li'l Joe first . . .

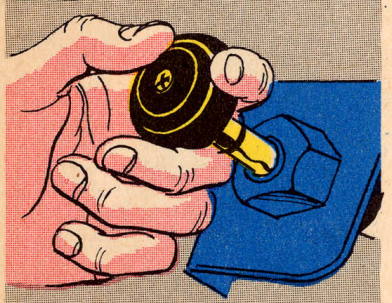


9

Open throttle completely. Turn starter only to ON position. Magnetos still OFF. Turn engine over at least 5 revolutions to clear cylinders of excess gas vapor.

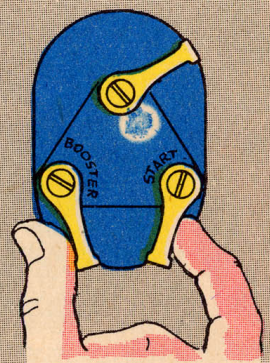
But—if there's reason to believe raw gas or water is in any cylinder, before turning engine over to clear cylinders, tickle the starter and feel out the engine for hydrostatic lock). If you feel lock, remove one spark plug from each cylinder (use plug wrench described on Page 645), and turn over the engine till all liquid is removed.

10



Now open hand throttle about one inch beyond free travel . . . for good starting RPM's.

11



Next, switch magnetos to BOTH ON position . . . depress booster and starter together to ON position.

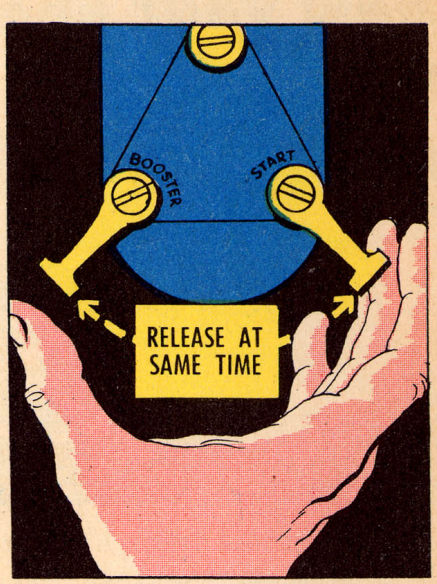
12

While engine's turning over, pump primer until engine kicks off, then stop pumping.

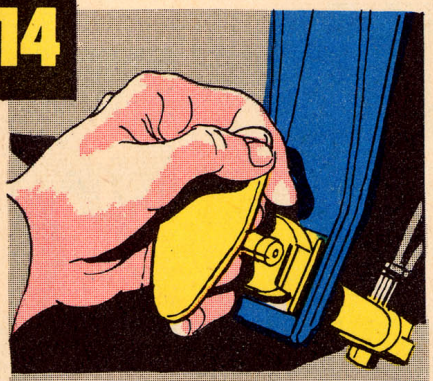
13

NOTE: Pumping primer without the engine turning over doesn't do any good . . . the primer nozzles are located under the intake ports . . . which means the gas can't get into the cylinders until the valve is open . . . furthermore, it just washes the oil off the cylinder walls.

When engine starts . . . release starter switch and booster switch at the same time. Booster switch is only needed to start the engine . . . its life expectancy is 5 minutes of continued use . . . so go easy on it!

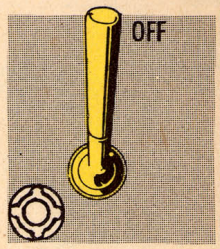


14



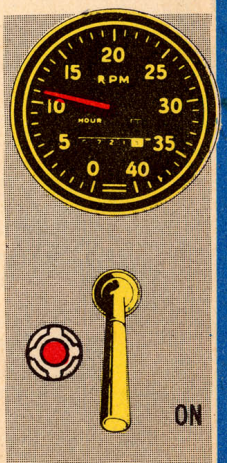
Pump hand primer to keep engine running . . . avoid flooding by synchronizing strokes until engine levels out.

If the batteries are run down and too weak to make a normal start, turn off the master-relay switch and start the main engine by means of a slave cable from another tank. Plug in the cable first; and be sure you have a positive to positive and negative hook-up. (When you get a minute, look up P.S. #7, page 272.) Start the other tank, run it at a high RPM then start your tank. Disconnect the slave cable when your engine gets up to about 1100-rpm and then turn on the master-relay switch.

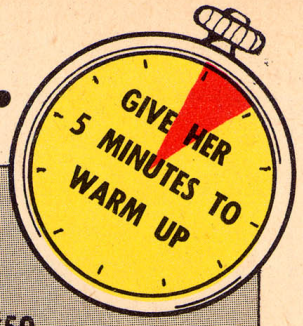


To start with "Little Joe", leave the master switch off and turn off all light switches, because when you start "Little Joe" you may burn out the lights that are on. Then hand crank the auxiliary engine, let it run a while. When it's warmed up and ready to put out a good flow, flick on the master-relay switch, and let your batteries charge for about 45 minutes. Then start your main engine.

In an extreme emergency and when the weather isn't below freezing you can start direct from "Li'l Joe" without first charging batteries. When you do this, leave master switch off until main engine gets up to 1100-rpm.



now your engine is running...



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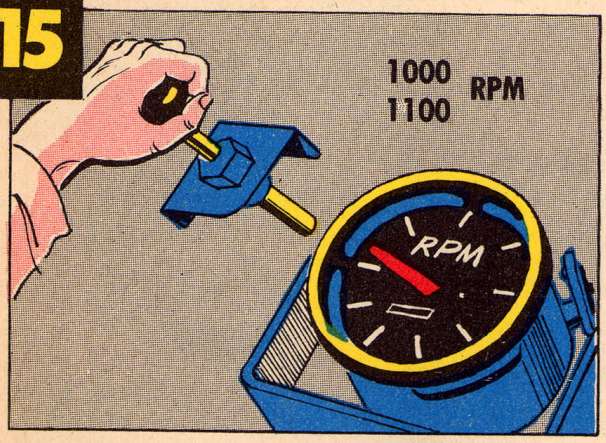
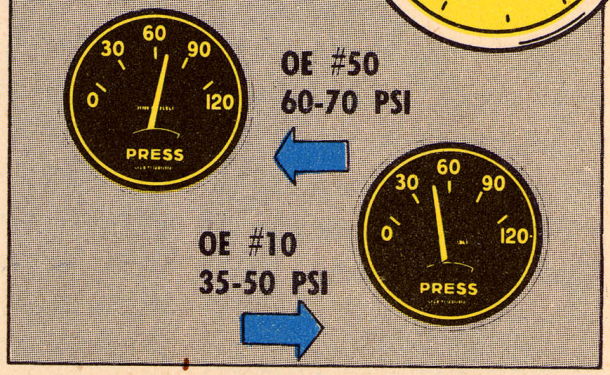


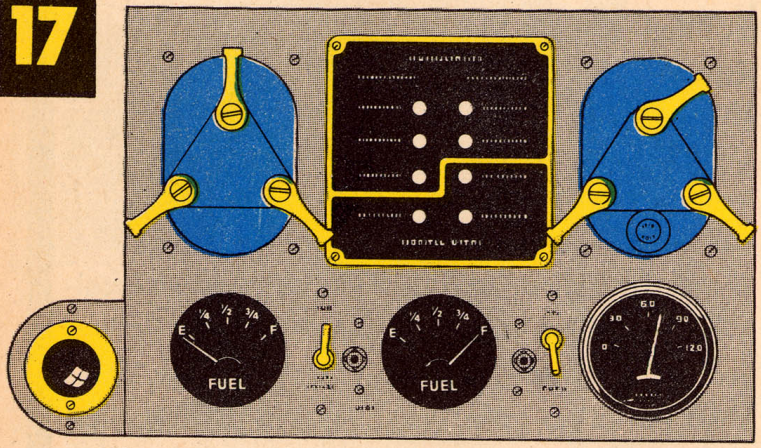
Adjust hand throttle 'til engine runs between 1000 and 1100-rpm.

16



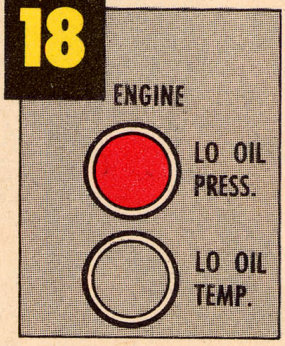
Check oil pressure gages for proper pressure.

17



All other lights on Xmas tree should go off **30 seconds** after starting.

18



If this light comes on at low idle (650-rpm) but goes out at 750 rpm, everything's normal.

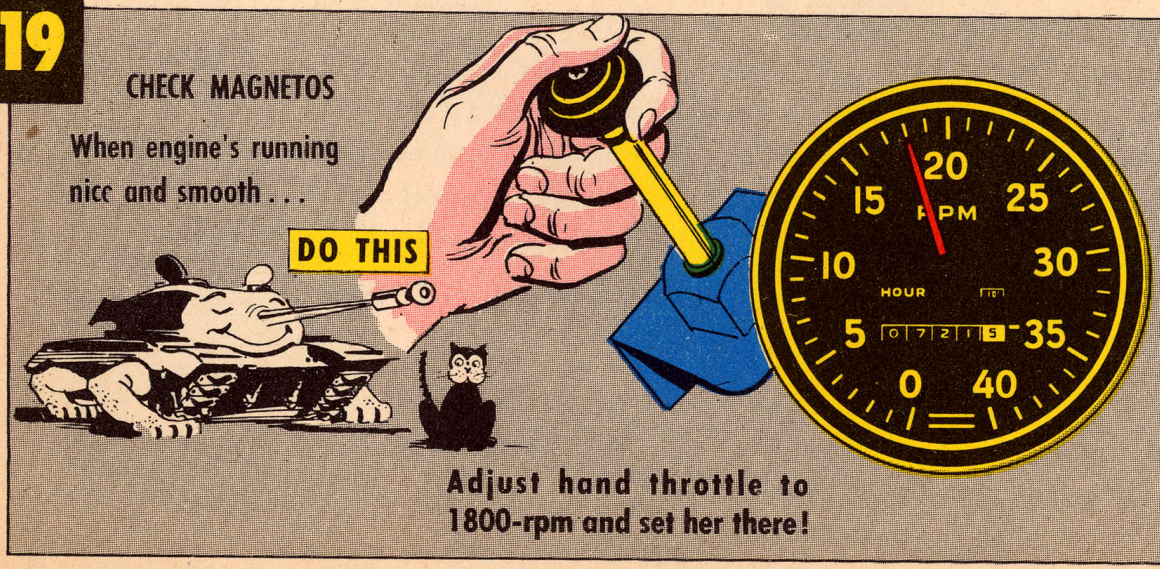
If "Li'l Joe" isn't needed, turn it off!

19

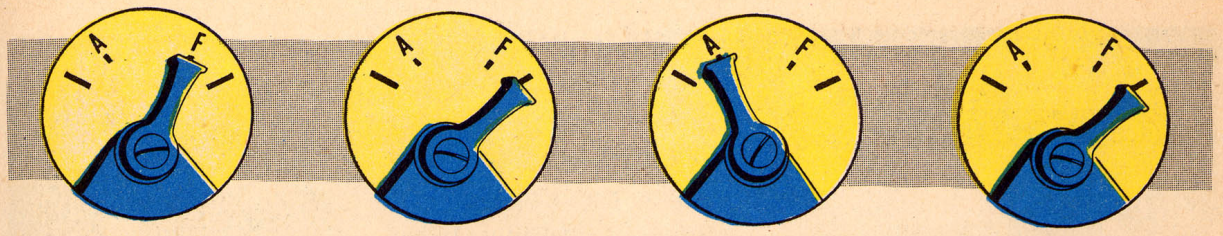
CHECK MAGNETOS

When engine's running nice and smooth . . .

DO THIS



Adjust hand throttle to 1800-rpm and set her there!



Move main magneto switch to F position and compare RPM reading with original 1800.

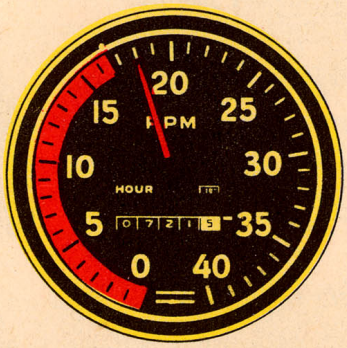
Now, back to BOTH ON until engine is again running at 1800-rpm (this clears plugs).

Then move switch to A position and again watch for a drop in RPM's from original 1800.

Again switch back to BOTH ON position and watch for the tach to come back to 1800-rpm.

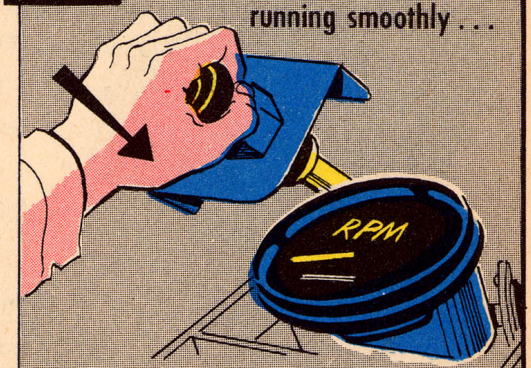
If it drops more than 150-rpm with magneto switch at A or F, you got troubles with the ignition system.

SOMETHING'S WRONG IF NEEDLE FALLS BELOW 1650



NEVER run engine more than 30 seconds with switch in either A or F positions.

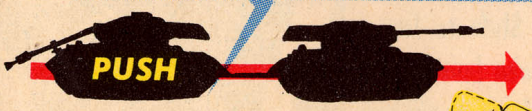
20 When your engine's running smoothly . . .



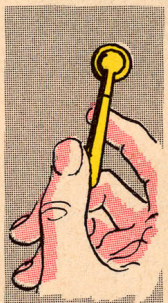
close hand throttle. Engine should drop to 650-rpm.

in case you need a push or pull to start . . .

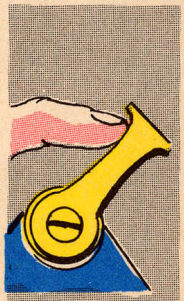
Best and safest way . . . pull with tow bar using recovery vehicle or wrecker. Or, if you only have 41's around, push with tow bar . . . but don't pull with tow bar—you'll break the tow pintle.



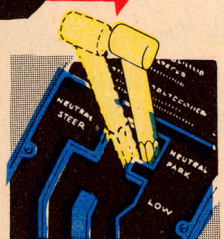
But if a tow-bar isn't around, next best is pulling with your tow cables. Hook the cables to the towing lugs (not to the pintle) and have them long enough so you won't climb piggy-back on the towing tank.



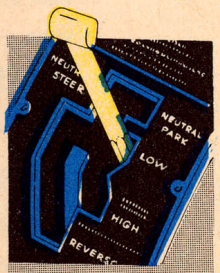
Turn on master switch.



Turn on magneto switch.



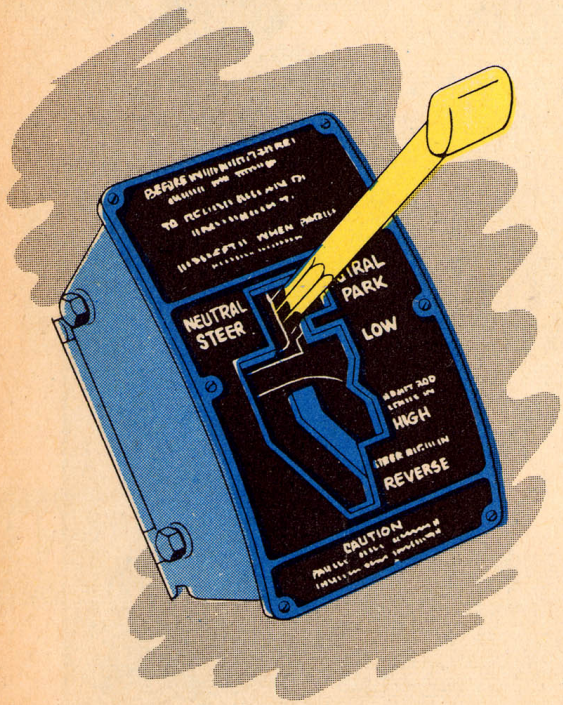
Release parking brake . . . move to neutral steer . . . back to neutral park.



When vehicle is moving at 5-mph shift to low.

Keep in mind while in neutral . . . keep your foot off the brake . . . if you step on it—you'll set the parking brake and the "T" bar will lock in neutral, killing your steer.

SHIFTING



TIPS—Here's a tip on shifting from **low** to **high** range . . . Pull lever straight back . . . it will ride over the small hump almost without effort. This way there's no chance at all of accidentally moving into reverse.

TIPS—To shift into any given range from a stop: Apply brakes, reduce engine speed to low idle (650-rpm), then shift.

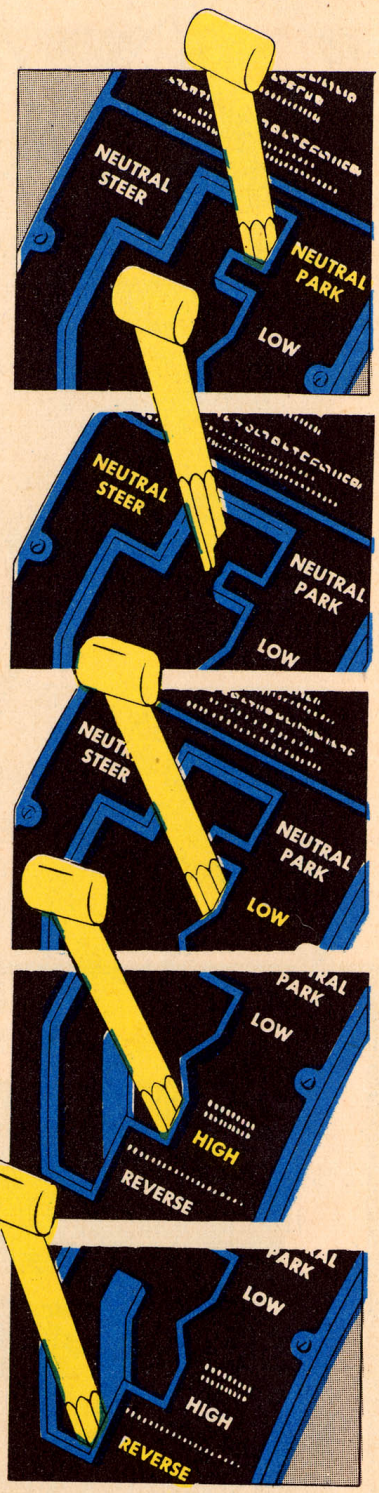
NEUTRAL PARK—Control lever all the way forward and to right. When range selector control lever is in neutral park and foot brake is applied, brakes are locked and "T" bar will lock in neutral position. To release parking brakes, move lever to neutral steer and they will automatically release.

NEUTRAL STEER—Control lever held to the left, is used only for pivot steer or to release parking brake.

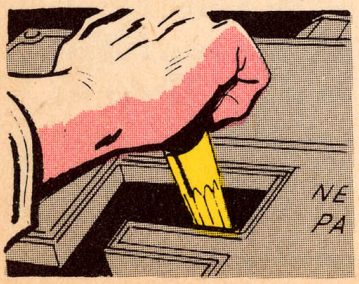
LOW—Control lever in first notch back from neutral. Spring on lever will pull lever to right, holding it in LOW detent.

HIGH—Control lever back one notch from low. Pull lever straight back. It will ride over the hump on range control box.

REVERSE—First bring vehicle to dead stop. Shift to low, pause, then move lever left, and back. The dead stop may save you one transmission—and $$$$$.



BRAKING



A REMINDER—Moving the selector lever into neutral park doesn't automatically set the brakes—the brake pedal must be jammed down **after** the lever is put into neutral park.

STEERING

When steering, don't jerk it around. Steady pressure is all you need . . . light and even does it best!

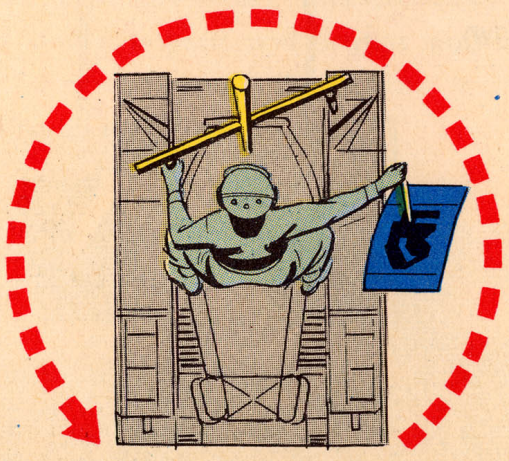
TO GO FORWARD—Keep both handles straight . . . easy as a bike.

RIGHT TURN—Pull back on right handle grip.

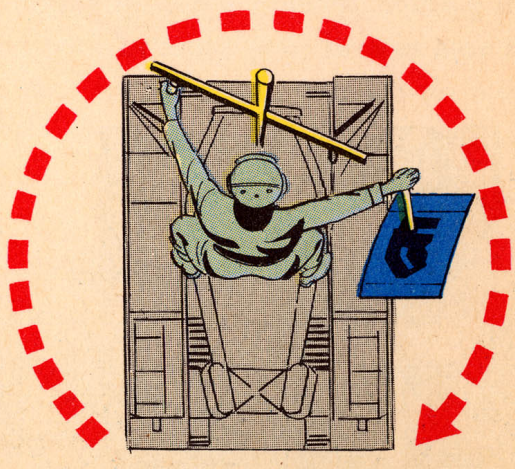
LEFT TURN—Pull back on left handle grip.

The amount of steer depends on how far back you pull the "T" bar.

STOP . . . Before going into a pivot . . . and don't pivot more than 180° or you'll make yourself track trouble. To pivot . . . push or pull handle as far as she'll go.

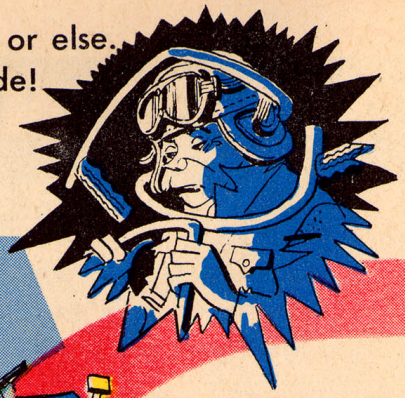


For a left pivot. Hold shift lever in neutral steer and pull back on left handle grip.



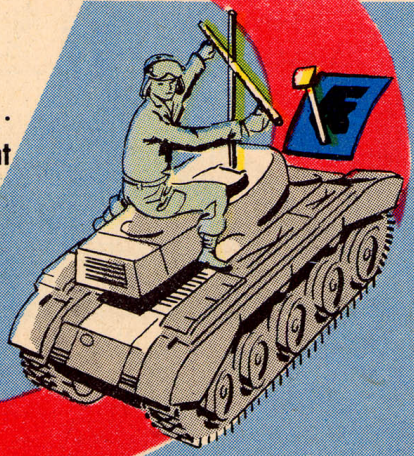
For a right pivot. Hold shift lever in neutral steer and push forward on left handle grip.

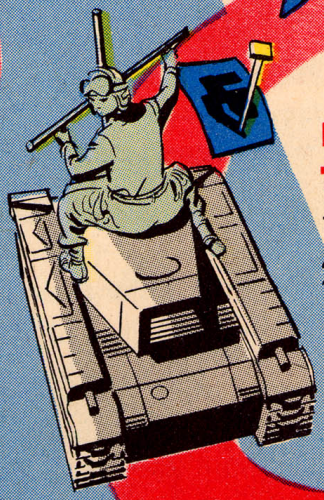
To go in **REVERSE** **STOP** before shifting . . . or else.
Before backing . . . get a guide!



BACKING TO LEFT

1. Shift to reverse . .
2. Pull back on right hand grip.



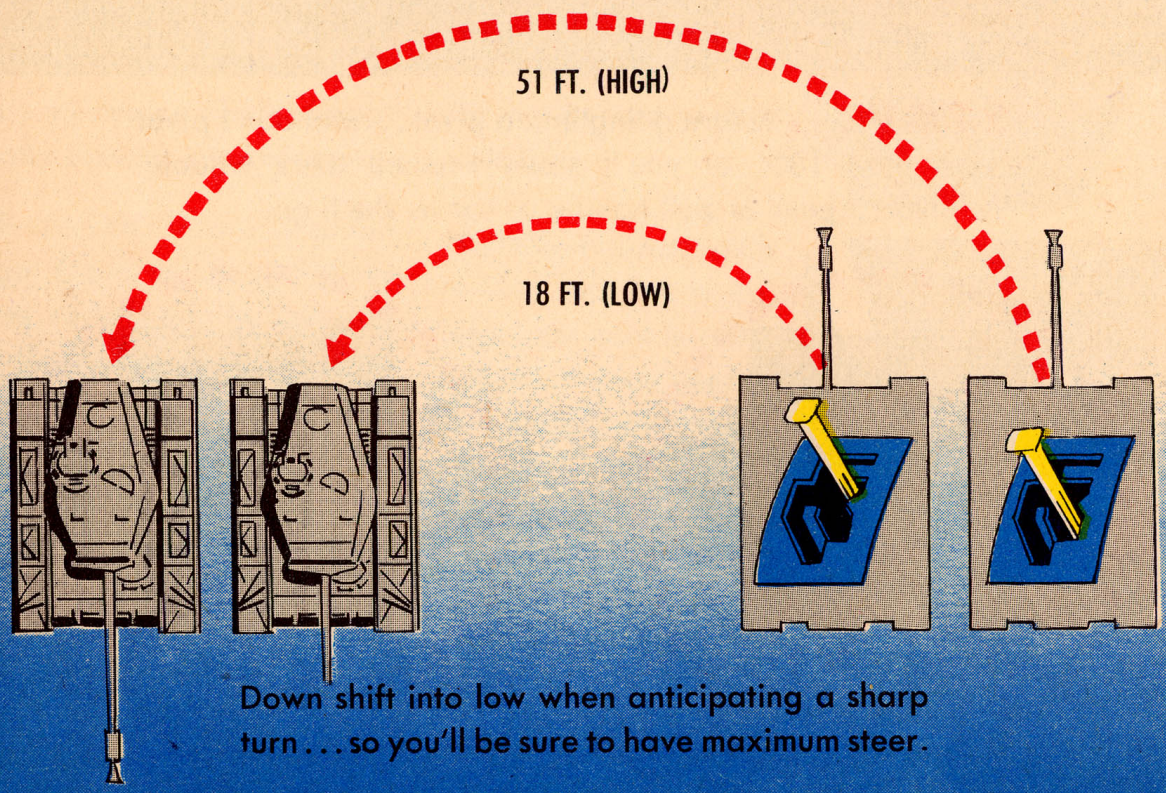


BACKING TO RIGHT

1. Shift to reverse . .
2. Pull back on left hand grip.

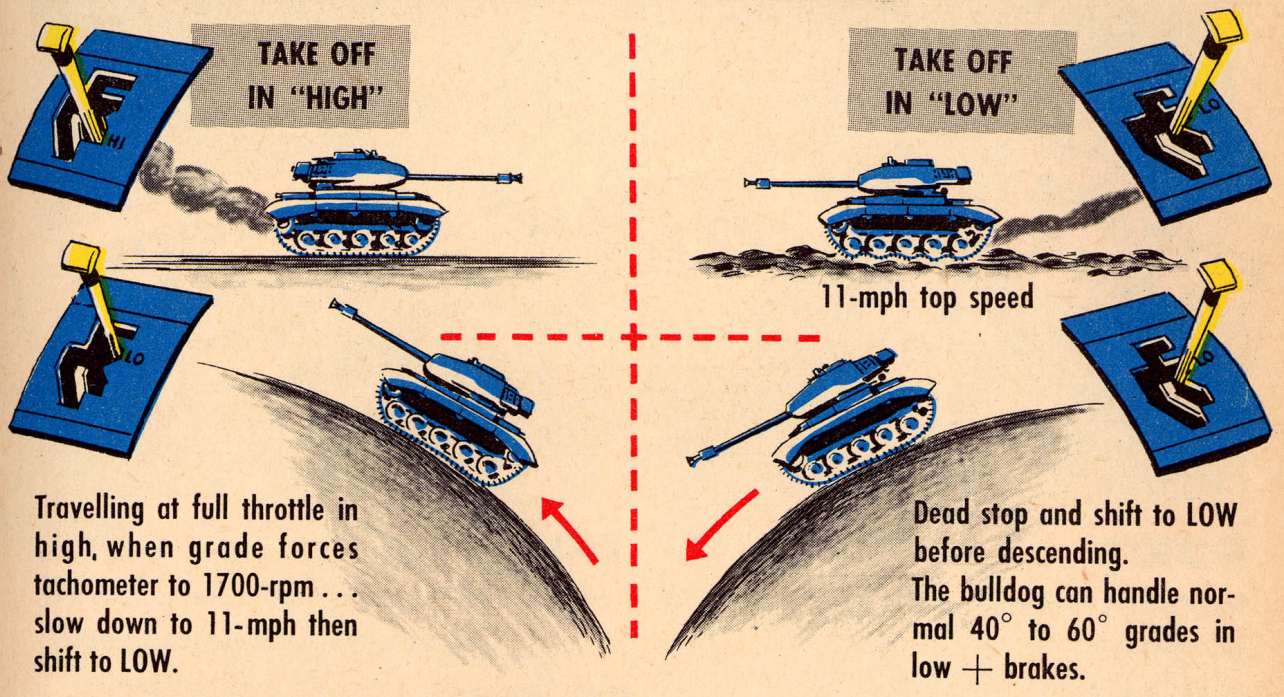
SPEED LIMIT 5 MPH MAXIMUM

the bulldog's turning radius



Down shift into low when anticipating a sharp turn . . . so you'll be sure to have maximum steer.

DRIVING the BULLDOG



Travelling at full throttle in high, when grade forces tachometer to 1700-rpm . . . slow down to 11-mph then shift to LOW.

Dead stop and shift to LOW before descending. The bulldog can handle normal 40° to 60° grades in low + brakes.

REVERSE BRAKING

To use reverse as a brake or not to use reverse as a brake is one of those questions with two or more answers. Some say the practice is OK—others say it's not. Here are the facts . . . you be your own judge because it's your tank and your neck.

It's dangerous because:

1. Steering is reversed, which can confuse even the best of drivers.
2. Transmission overheats, causing internal transmission damage.
3. Reverse torque might stall the engine.

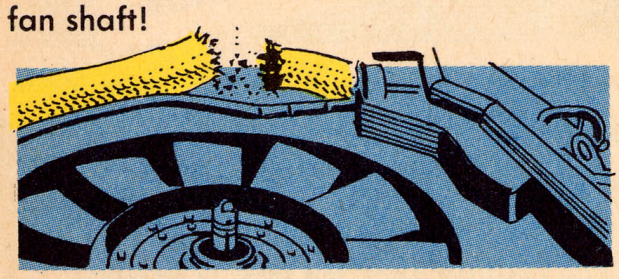
But, in places where hills are steep and a long way to the bottom, holding her back with low gear and brakes may not do the trick because your brakes may be shot before you reach the bottom. In cases like this, the only thing you can do is use reverse as a brake.

To use reverse as a brake you must:

1. Stop before shifting into reverse.
2. Keep perfect control of the tank. ***Remember,*** the steering is opposite from normal.
3. Use enough engine power to control the descent and keep from stalling the engine.
4. Keep an eye on the transmission-temperature warning-light. If it comes on, stop the tank, hold'er with your brakes, shift into neutral, and run the engine at 1700-rpm until the warning light goes out.

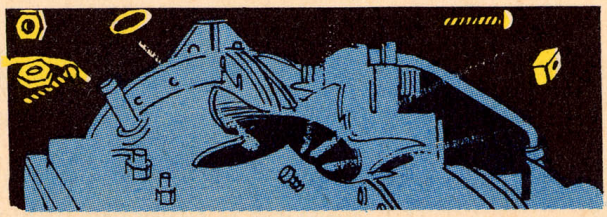
DON'T gun your engine with foot throttle . . . always increase engine speed gradually!

OR ELSE you might snap the cooling fan shaft!



DON'T race your engine and jam into gear to jerk outa mud holes . . . put her in low . . . give her the gun—nice n' easy!

OR ELSE you'll bust the guts out of your transmission!



NEVER

.....try to pivot-steer by racing engine . . . this is asking for trouble.

.....apply intermittent left or right steer to slow tank . . . use brakes.

.....use brakes during a turn . . . it reduces steering effectiveness. Slow down **before** you turn.

.....leave tank unattended with transmission in gear . . . set parking brakes.

.....fail to make a complete stop before shifting into neutral.

.....start without stationing fire guards at rear of tank.

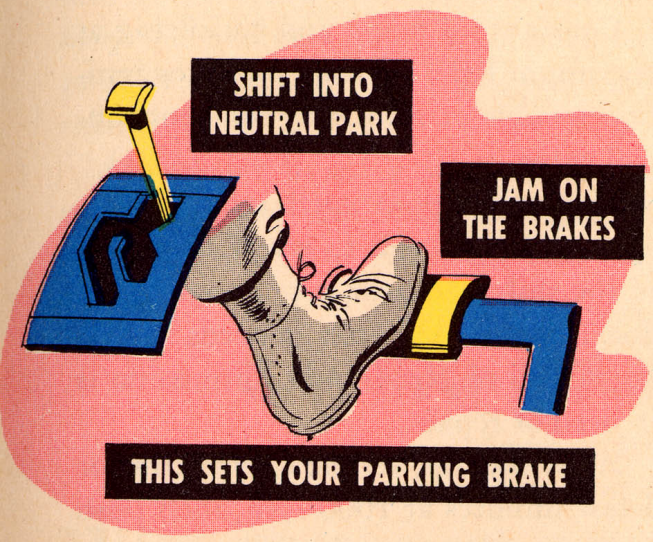
.....downshift while going above 11-mph . . . it's deadly.

.....back up without a guide (unless someone's shooting at you).

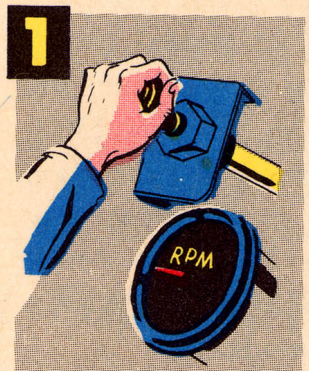
STOPPING and IDLING

When coming to a stop, be sure tank comes to a dead stop before shifting into neutral. Because when you're in neutral the T bar will automatically lock in neutral, killing your steering.

If ever you must park with engine running, set hand throttle so engine'll run at 800 to 1000-rpm. This'll keep the engine in good shape.

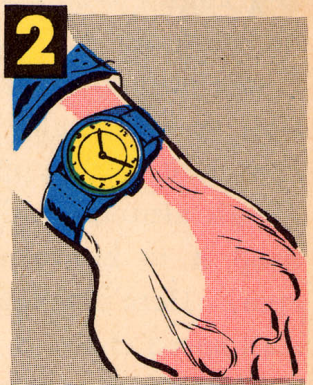


1



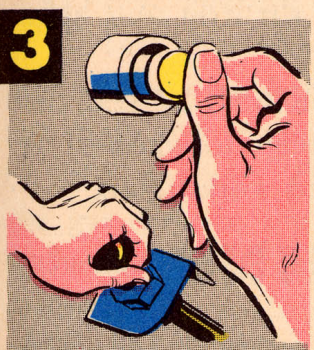
Idle the engine at 1000 -rpm.

2



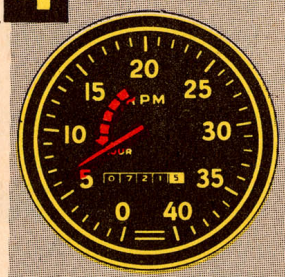
Let it run for 5 minutes to cool off

3



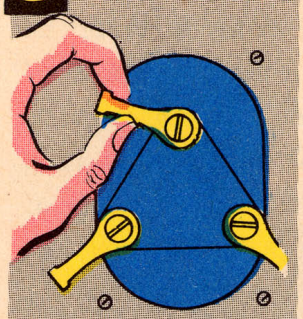
Push in fuel cut-off switch (degasser) . . . close throttle.

4



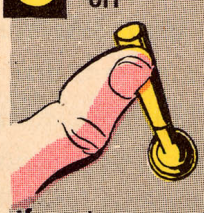
Engine'll drop to 650-rpm . . . hold in degasser 'til she stops.

5



Turn magneto switch to OFF position.

6

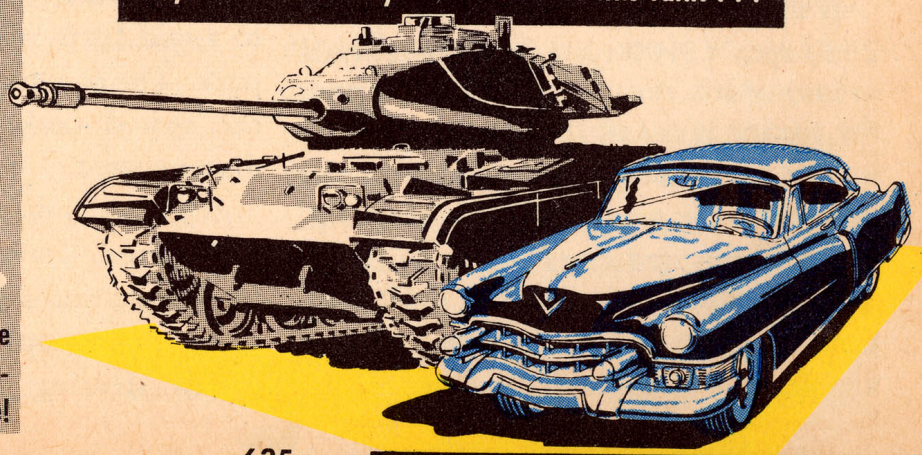


If you're not using any current . . . turn off master-relay switch . . . but make sure turret and radio switch are off first.

7

WARNING—Never try to use master-relay switch or magneto switch to turn off engine!

If you take halfway decent care of this tank . . .



It'll behave just like any other Cadillac!

OPERATING TIPS

STALL SPEEDS

A good way to know if your T41's engine is in good shape is to have maintenance pull a stall-speed check. Under normal operating conditions the stall speed should be between 2300-rpm and 2400-rpm in high range. (High altitude and desert areas may drop it to between 2200 and 2400-rpm). Here's a run down on how a stall speed check is made.

First check transmission and engine oil-levels, then start the engine and run it till both engine and transmission are at normal operating temperature. Next, place range-selector-control lever in HIGH and jam down hard on the foot brake. Hold the brake down and gradually increase engine speed with foot accelerator until throttle is wide open. The tachometer needle should level off in the RPM ranges mentioned. Don't keep the throttle open longer than 30 seconds and don't run a stall check in LOW.

If the tachometer needle drops below 2300-rpm (2100-rpm in high altitude areas) with the throttle wide open, the engine is not operating properly. If it goes up to 2800-rpm or against the governor, the transmission is slipping.

2200-rpm indicates carburetion or ignition trouble. At 1900 to 1950-rpm, check for restricted air-flow through air cleaner, or blocked air hoses. If the cleaners and air hoses check out OK, trouble could be a broken quill shaft in the supercharger.

Constant misfiring and backfiring at maximum RPM in stall indicates ignition trouble or a sticking hot-spot-control valve.

2800-rpm could spell selector-linkage trouble. Check to see if the point of the shift indicator is centered on HI dot. If it isn't, the linkage needs adjusting; if it's centered, the transmission is in need of repair.

After the test, let the engine run for a few minutes at 1000-rpm, then push in degasser, close throttle and stop engine.

Incidentally, when in HI STALL, the tank should not creep forward—if it does, the brakes need working on.

TOWING

When towing a crippled T41, and you believe the trouble is in the transmission, use a wrecker or a recovery vehicle with a tow bar and disconnect the universal joints on the lame tank to avoid further damage to the power pack. The tow bar gives you control of the towed tank when the joints are disconnected.

If the transmission's OK—you can use tow cables, leave the universal joints be, and station a driver in the sick tank to steer and stop.

For steering, have him shift into

LOW (steering is best in low); and when he's back on the straightaway, have him hold the lever in NEUTRAL STEER. If you have it in NEUTRAL PARK, the parking brakes will lock if you apply the foot pedal—automatically, the "T" bar will lock in neutral and you'll have no steer. Have him keep the two tanks in line as much as possible, especially when it is wet and muddy.

Always try to use a wrecker or recovery vehicle with a tow bar, but if you must use a tow cable, use two 10-footers, cross them and connect their eyes to the two towing-shackles on the rear of the tank. Be sure to avoid short bends in the cable because they'll break some of the cable's strands every time and leave it weak and dangerous. On the towing tank, position the gun to the front to keep it from ramming the towed tank in case it lurches forward.

Caution: Never use a T41E1 with a tow bar to tow another tank because the pintle hook on the rear of the T41, isn't designed to pull another tank—it may snap off during the jerks. It's there primarily to pull light stuff like trailers, jeeps and small trucks.

GAGING YOUR FUEL SUPPLY

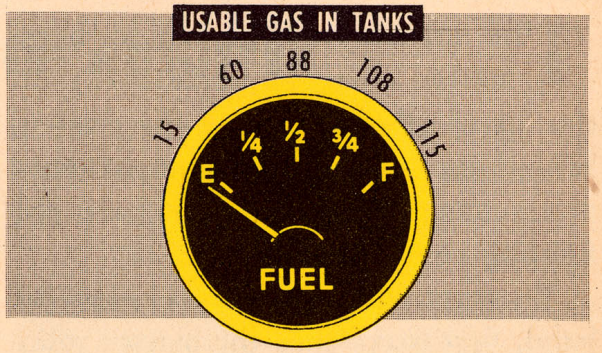
Some oddities to know about the fuel gage and tanks.

When gassing up, peek at the fuel shut-off-valve located 'way downstairs in the fighting compartment and make sure it's set at the BOTH ON or OFF position. This valve controls the gas flow to the engine and **also between both tanks** in these two positions. If you're not careful, you could go off half loaded.

These two positions also apply when reading the fuel gage because the gage's only float is in the right tank. The LEFT ON and RIGHT ON are used only if one gas tank is damaged.

This fuel-gage sending-unit (in the right tank) indicates on the fuel gage the fuel level in both tanks, but only if the fuel-selector switch is turned to the BOTH ON position.

However, due to the dizzy shape of the fuel tanks, the reading on the fuel gage doesn't indicate the actual amount of usable gas in both tanks. So, if you want to keep posted in terms of actual gallons of gas you can use, mark your fuel gage like this:



Although the tanks hold 140 gallons, 25 gallons of this gas won't be used because the gas-line outlet is about 2" up off the gas tank's bottom. It's made this way so the dirt and water that usually settles on the bottom isn't drawn into the engine's fuel system. This means when the gage is on "E", you actually have 40 gallons of gas in the tanks, but only 15 gallons are usable.

AIR-CLEANER DUCTS *versus* PERSONNEL HEATER

Normally, the air-cleaner ducts are adjusted to draw air from the fighting compartment. This is fine for mild or warm weather, but it's not so good in cold weather. The main engine draws so large a volume of air with hatches closed tightly that the air pressure in the fighting compartment may drop to a point where the heater will not burn efficiently.

At this point the crew may also begin to lose efficiency.

Correct the condition by adjusting the air-cleaner ducts so that air is drawn from the engine compartment rather than the fighting compartment. This means moving the duct damper from the rear position to the front position. You do it by turning the turret until the air-duct openings in the bulkhead are accessible from the fighting compartment; then rotate the handle in the center of each duct, clockwise, until the damper is all the way to the front of the duct.

This'll take approximately 100 turns. But don't get tired turning and leave the damper part way between the two extreme positions—this'll leave an opening in the bulkhead and give you a definite fire hazard.

When warm weather comes, return the damper to the rear position, and be sure to take care of both right and left ducts.

AUXILIARY-ENGINE HAND-STARTER

The auxiliary engine has its hand starter mounted horizontally on the lower inboard side of the engine, behind the right engine-compartment access-door, and is reached from the fighting compartment (Fig. 22).

To start the auxiliary engine by hand, first make sure the master relay and radio switches are off. Next turn your auxiliary-generator control-switch to RUN. If the temperature is low and the engine is cold, pull out the choke to full choke. With the handle, crank the engine up to compression stroke with a series of short, easy pulls. Then release the handle and let the cable completely rewind. Now pull the handle with a steady, slow, even, long pull. Let cable rewind before attempting another start.

If the engine doesn't start after three tries, slightly decrease full choke position. And try it again. When pulling, it isn't necessary to spin the engine.

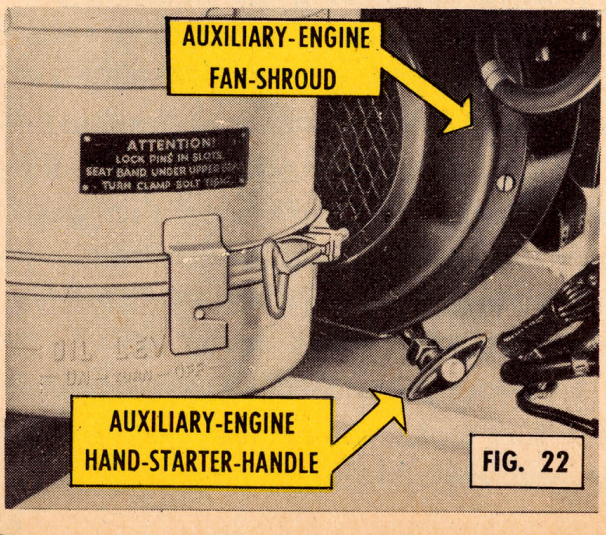


FIG. 22

how to use the AUXILIARY-GENERATOR HEAT-EXCHANGER

There's a tube-type heat-exchanger incorporated in the exhaust of the auxiliary-generator engine. A 6-kilowatt electric-heater-element is also built into the heat-exchanger-duct housing to impose a load on the auxiliary engine for quicker warm-up. All of this provides warm air for the main-engine compartment, and quick engine-warm-up for easier starting in extreme cold.

The thing to keep in mind is, with the electric heater ON, only approximately 1½ KW of electrical energy are available from the generator to operate other equipment in the vehicle. Therefore, it's important to know how to use the heat exchanger correctly.

A damper lever, mounted on the back side of the duct, directs the flow of heated air: For normal weather operation, set the duct-damper lever to OFF position (lever to extreme left). This setting throws heated air out of the tank—if air temperatures get above 150° F around the auxiliary-generator engine, it'd cause a vaporlock.

In extreme cold weather, set damper lever to ON position (lever to extreme right). This'll direct heated air into the main-engine compartment.

After the auxiliary-generator engine is started, turn ON electric-heater switch located on the auxiliary-generator control-box in the driver's compartment. When the engine compartment is warm enough, turn OFF electric-heater switch.

And remember—use the heater element only when you need to load down the auxiliary engine for a quick warm-up of the heat exchanger and hotter air to the engine compartment.

driver's BACK-REST ADJUSTER

In tanks below Manufacturer's No. 1360, the driver's seat—when it's down and all the way back and the driver's leaning against the back-rest—will bump into the turret guard and stop the turret from traveling. If you're a big, heavy driver and must use this extreme position, you'd better limit the degree of adjustment before you get more than a back scratch.

Protect yourself by having Ordnance make a positive stop for the seat adjuster. The stop (Fig. 23) is ⅜" square-bar stock, tack-welded to each side of the adjuster assembly, directly over the rear notch. It limits the seat adjustment to allow enough clearance between the back-rest and the turret guard when you're relaxing in the seat.

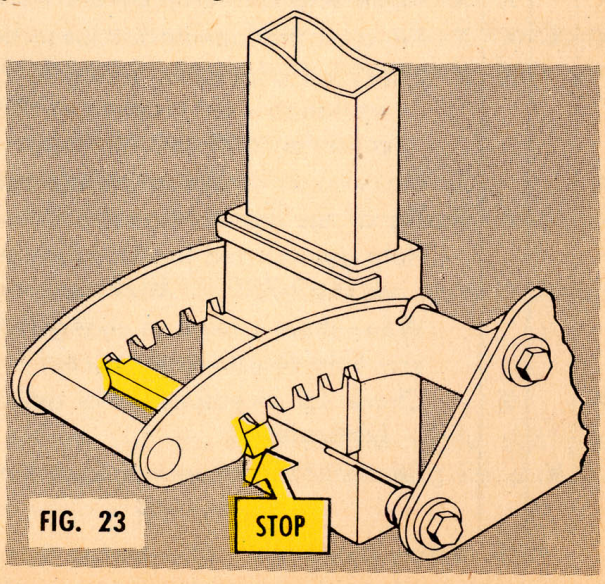
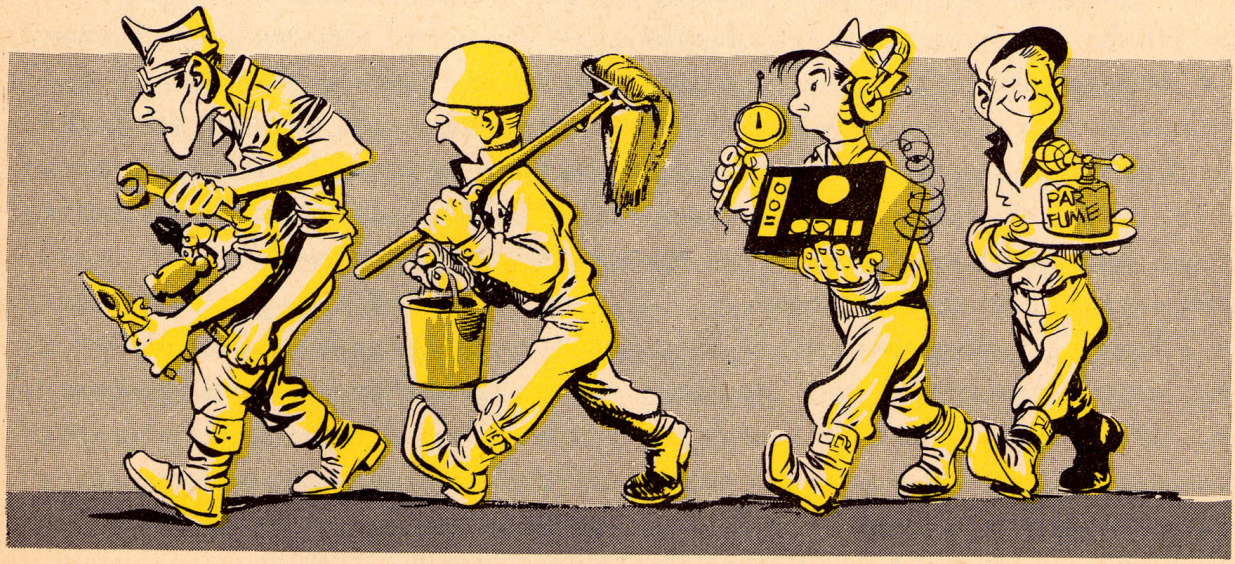


FIG. 23

WHO does WHAT and WHEN

Here's a suggested recipe for how the four of you can get organized in the morning, noon, and night, to keep your Bulldog groomed and fed.



BO	DO	AO	WK*	COMMANDER'S RESPONSIBILITIES
X		X	X	Fill out check sheet during inspections.
X	X	X	X	Supervise inspections made by other crew members.
X		X	X	Inspect tracks, road wheels, rollers, bumpers, sprockets, and compensating wheels for damage.
X		X		Check track adjustment.
X		X	X	Examine tracks for worn or bent guides, loose track-shoe-pin nuts, track pads, and connections.
X		X	X	Check under the vehicle for oil or fuel leaks.
X			X	Determine if lamps and reflectors, horn, fire extinguishers, paulins, tools, etc., are in the proper place and in good operating order.
X		X	X	Make sure all hatch covers work neat 'n easy.
X	X	X	X	Keep on the lookout for loose bolts or parts.
		X	X	Check all accessible wiring to be sure it's connected tight and supported, that insulation is not cracked or chafed, and that conduits and shielding are in good condition and secure. Report any unserviceable wiring.
X			X	Make sure canvas covers are secure and serviceable.
			X	Try all the lights. Inspect all lenses.
				Help gunner and loader lubricate suspension and all exterior points like it says in LO 9-730 . . . **but** see page 612 for suspension-lube change.
				When there's need to change lubricants and special oils to agree with the LO—you help too, to make sure.
X		X		Check for sweating, have moisture removed from all parts and then get 'em lubricated.
	X			Be alert for unusual noises or conditions.

*BO—Before Operations DO—During Operations AO—After Operations WK—Weekly

BO	DO	AO	WK	
	X			Check exhaust for excessive black smoke to see if your engine is on the beam.
	X		X	Check radio and interphone system; security of radio, antenna, and of outside equipment.
X	X	X	X	Investigate and correct or report any faults noted during operation. Complete trip ticket and forward to platoon leader, together with request for any second-echelon maintenance you need.
		X	X	Help other crew members clean glass, vision devices, inside of tank and wipe or wash off exterior.
			X	Help check gear cases for collections of sludge or water and clean out if need be and refill.
X		X	X	See that winterization equipment is snug in place and ready for action.
		X	X	Take care of the cal. .50AA gun—keep it in top shape.
X			X	Check fixed fire-extinguishers and controls.
X				Check vehicle fording limits before fording.
	X			Check rate of fire. Watch out that the tube doesn't get overheated by prolonged high rate of fire . . . get an unfired round out of an overheated chamber so it won't "cook off" when nobody's expecting it.

DRIVER RESPONSIBILITIES:

X		X		Check fuel in tanks and be alert for leaks. Caution: Refuel to 6½" from top of fuel-tank, with hose nozzle resting on tank to discharge static electricity. Check the spare-fuel containers. Check oil levels of engine and transmission and auxiliary engine—add oil if necessaary.
X				Drain fuel-line filter.
X			X	Check in the engine and driver's compartment for any indication of fuel or oil leaks.
		X	X	Check carburetor air-hoses for holes and loose fits.
X	X	X		With the engine running, check all instruments for normal readings, and the transmission for proper oil level.
	X			Operating Observations: While you're in operation, be alert for unusual noises that may be a sign of trouble. Instruments tell a tale, watch 'em for any unusual readings. Every time the brakes are used, gears shifted, or the vehicle turned, consider it a test and note any unusual or unsatisfactory performance. Stop the engine and investigate immediately if any warning lights come on.
	X			Be alert for unusual power demand when putting vehicle in motion, it indicates stiffness of lubricant in the final drives and suspension components. Take care of any malfunctions immediately.
X			X	See that you've got a good periscope spare and heads.
X		X		Check escape hatch, drivers compartment for oil leaks.
X	X	X		Inspect engine compartment for oil leaks, oil-cooler lines, final drive housings, transmission, etc.
				Lubricate engine and transmission per LO 9-730, and get the items in driver's and engine compartments like it says.
				Clean engine and transmission oil-filters as required.
X		X	X	Check engine cooling-fan for proper operation.
			X	Check battery for water levels, proper charge, corroded terminals, tightness, shorts, and see that it has a coating of grease. If you're parking for a couple of weeks, remove batteries and store in cool place.
				Clean driver's compartment.

BO	DO	AO	WK	
		X		Check fire extinguishers in driver's compartment, adjust nozzles.
				Keep engine and engine compartment clean.
			X	See that all wiring in the engine and driver's compartment is secure and supported, that insulation isn't cracked or chafed, and that conduits and shielding are in good condition and secure.
				Assist other crew members in cleaning snow, ice, and mud from all parts of vehicle.
X	X		X	Check auxiliary generator operation and heater operation.
X			X	Check oil-cooler cores, engine and oil-cooler fans, engine baffles, and top deck grille.
			X	Make sure assemblies such as carburetors, generator, magnetos, starter, fuel and bilge pumps are tightly mounted and connected.
		X	X	Check synchronization of selector-control and steering linkage with valve body on transmission.
		X	X	Take a quick look at conduits and shieldings on your wiring.

GUNNER RESPONSIBILITIES

				Lend a hand when they're washing the vehicle.
			X	Check all accessible wiring in turret and make sure it's secure and supported, that insulation isn't cracked or chafed, and that conduits and shielding are in good condition and secure. Report any unserviceable wiring.
				Lubrication. Lubricate inside turret in accordance with instructions contained in lubrication order.
				Armament. Dry the bore and chamber of 76mm gun. Dry the barrel and chamber of cal. .30 Browning machine gun, M37.
				Clean and coat 76mm gun tube as prescribed on the lubrication order.
X	X	X		Check oil in recoil mechanism and be alert for excessive leakage.
X	X		X	Check adjustment of firing and safety mechanism. Elevating or traverse handwheels should operate without force.
			X	When 76mm gun tube is cool enough to be touched with the bare hand, on that day and for the next two days (or longer if sweating continues), thoroughly clean the bore and chamber with rifle bore cleaner using the bore brush. Make sure all surfaces are coated with cleaner. Do not wipe dry. After the third day, wipe dry and oil. Clean and oil cal. .30 machine gun.
			X	Clean periscopes in turret.
		X	X	Clean all weapons, check for rust.
	X			Be alert for any unusual noises or improper conditions.
			X	Help loader police-up inside of turret.
X			X	Clean all optical glass.
			X	See that canvas covers are snug on breech, muzzle, instruments, etc.
X			X	Inspect guns and see if they're in operating condition.
		X	X	Keep paint on gun mount in good condition.
X		X	X	Look for loose bolts or nuts.
X		X		Check operation of all lights in turret.
X				Check contents of right outside-stowage boxes and keep 'em clean.
X				Check and clean azimuth indicator.
X				Check and clean coaxial gun and mount.
X	X	X	X	Check sight adjustment.

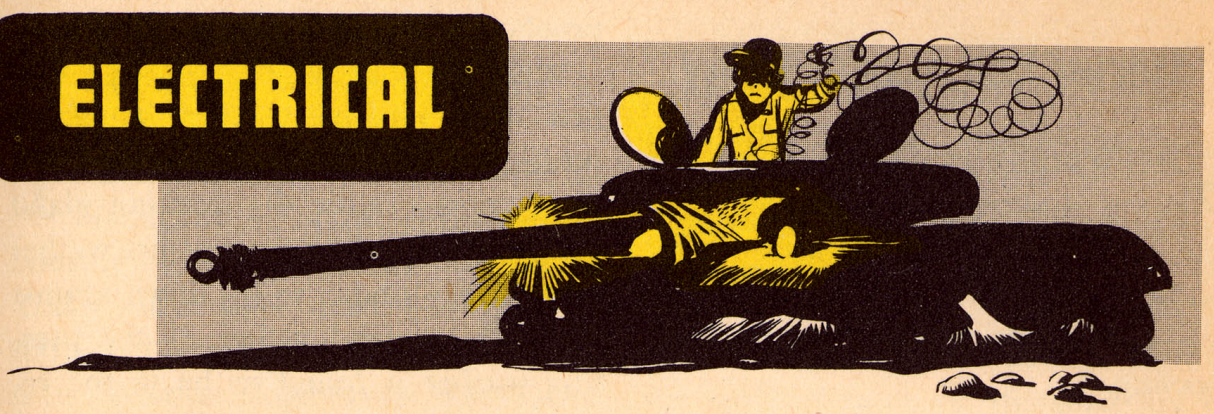
BO	DO	AO	WK	
X			X	Check hydraulic oil in reservoir.
X		X		Check elevating mechanism and firing controls.
X		X		Check gun book—see if up to date.
X		X		Check headspace on machine guns.
X			X	See if all gun tools and spare parts are aboard and in their places, also periscope, spare heads and holder, and spare vision blocks, elevation quadrant, telescope and mount.
X			X	Clean chamber and breech mechanism. Dry fire (before firing). Dry gun bore after firing.
X			X	Make sure the turret lock and gun-traveling lock really lock . . . and remember, you don't use 'em both at the same time.
X			X	See that equipment in turret's stowed securely.
				In extreme cold, make sure lubricants and special oils agree with LO specifications.
		X	X	Assist commander in checking gear cases for sludge and water, clean and refill if necessary.
	X			Be alert for unusual noise or operation—get at the trouble before it buggers something.
X			X	Keep right air cleaner filled with oil and clean as often as necessary. **Warning:** Under extremely dusty conditions or blowing sand, it's necessary to service the air cleaner several times daily during operation to prevent getting dust or sand into the engine and wearing out engine parts in short order.
		X	X	If elevating and traversing hand wheels are too stiff, go get Ordnance.
				Be careful not to overheat gun tube during prolonged high rate of fire, or allow unfired round to remain in overheated chamber—a "cook-off" is an unhappy surprise.

LOADER RESPONSIBILITIES

		X	X	Clean and coat 76mm gun tube as told on the lubrication order.
X		X		See that the breech and percussion mechanisms work OK.
X	X	X		Make sure the recoil mechanism has enough oil and no leaks.
X		X		Check adjustment of firing and safety mechanism.
		X	X	Clean and oil the breech and percussion mechanism.
X		X	X	Check contents of left outside-stowage boxes and spare engine oil. Keep boxes clean.
X		X	X	Check all other outside equipment.
X		X	X	Examine the seals on the fire-extinguisher control-head, remote-control handle, and safety valves. If the seal wires are broken or safety seal is missing, replace with fresh cylinders.
		X	X	Clean all fire extinguishers, adjust discharge nozzles.
X	X		X	Look for loose bolts or parts.
		X	X	Check spare hydraulic-recoil oil.
X		X	X	Check loader's hatch, signal flares and oil can (full).
	X			Unusual noises or unusual operating conditions are fair warning of trouble to come—stop them before they stop you.
X		X	X	Check coaxial gun and mount and help keep them clean.
				Help keep inside of turret clean.
X		X		Check and re-establish oil reserve in recoil mechanism.

BO	DO	AO	WK	
		X	X	Polish recoil slides.
X		X		Secure or release traveling locks and latches.
X	X		X	During operation, in dusty and sandy terrain, keep recoil slides and exposed points dry to prevent sand and lubricant from forming an abrasive paste. When it's possible to wash the tank, you help, too.
		X	X	Help gunner check all accessible wiring in the turret and be sure it's snugly connected and supported, that the insulation is not cracked or chafed, and that conduits and shielding are in good condition and secure. Report any unserviceable wiring.
		X	X	Check to see that all tools and equipment are in good shape and in the right place. Keep 'em clean, too.
X			X	Inspect towing hooks and pintle for looseness, damage, and wear. Test to be sure that latching mechanism closes and latches securely.
				See that TM 9-730, TM 9-308A, and SNL G251 are on hand.
				Help lubricate the suspension and all exterior points.
X		X	X	Help gunner dry the bore and chamber of 76mm gun. Dry the barrel and chamber of cal. .30 Browning machine gun.
		X	X	Help gunner clean weapons.
		X	X	Examine for corrosion, or other damage.
X				Check ammunition for proper stowage.
X	X	X		Look for excessive oil leaks in recoil mechanism.
	X			Test for smooth operation, length of recoil, and return to battery without shock.
	X			Check rate of fire. Gage your shooting—don't allow tube to get over-hot due to prolonged high rate of fire or allow unfired round to remain in overheated chamber because of danger of "cook-offs".
				Weekly or after 50 rounds, whichever comes first, remove and clean bore evacuator, clean out all carbon deposits and all foreign matter from inserts or gas ports.
				Note: Take care in assembly, disassembly and handling of the evacuator chamber, to avoid damage to the bore and inner lip of the front and rear evacuator heads.
X	X		X	Make sure the ventilating blower's in good shape.
X			X	Check left air cleaner, fill daily with OE 10 and clean as often as necessary to keep it at top performance.
				Warning: Under extremely dusty conditions or blowing sand, you'll need to service the air cleaner several times daily during operation to prevent dust or sand blowing into the engine. Otherwise engine parts wear out in a short time.
X				When parking in desert or snowy areas check engine vents and other exposed vents and keep them covered with cloth to prevent entry of dust, sand, or drifting snow.
X		X	X	Clean snow, ice, and mud from all parts of weapons and mounts.
X		X	X	Assist driver in checking for oil-cooler line leaks, transmission-oil level and engine-oil level.
X				Check fuel-shut-off valve. Should be at BOTH ON position.

ELECTRICAL



SPARK-PLUG WRENCH

MOST PEOPLE will tell you it's impossible to remove the imbedded spark-plugs while the engine's submerged in the tank. But it can be done. Although the maneuver isn't mentioned in the latest TM, it's been common practice among some crews that have armed themselves with the proper inducer.

The gimmick is a tubular wrench (Fig. 24) that you can wiggle into the crevasse and slide over harness, nut and all, to get the job done. As yet, this wrench isn't a stock item, but it's easily made with a 13/16″ socket, a piece of 7/8″ ID thin wall tubing 3″ long, a piece of 5/8″ ID tubing 3½″ long and a 7/8″ hex-nut.

You cut off the socket's drive end, flare the 7/8″ ID tube and weld it to the socket. Weld the 5/8″ tubing on the other end of the 7/8″ tube, then weld the 7/8″ nut on the naked end of the 5/8″ tubing.

Use it thusly:

Disconnect the harness nut.

Slip the wrench over the harness nut and then down on the cable.

Then wiggle it down into the engine and work it onto the plug. (Push the harness nut down until it rests on the plug.)

The wrench's hex-nut will stick out far enough to get an open-end wrench on it.

The plug and cable come out as one unit, even plugs in #2 cylinder can be easily removed and installed.

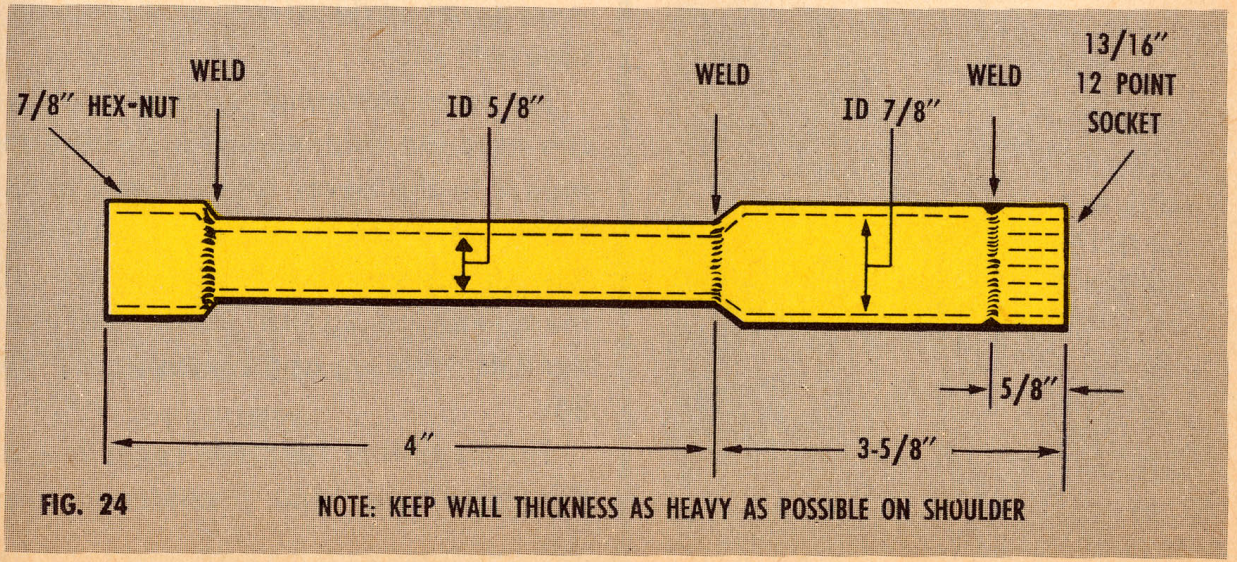


FIG. 24 NOTE: KEEP WALL THICKNESS AS HEAVY AS POSSIBLE ON SHOULDER

Want something not covered here? Write Half-Mast

Starter and Master Relay

SOMEWHERE along the line the 41's got a new-type starter relay. This new relay (G251-7983413) has heavier contacts which will stand up under repeated starts. It also has better water proofing.

It's interchangeable with the old type (G251-7527778) (Eclipse) which is still used as the master relay. If ever your master relay burns out, it's a good idea to replace it with the older type—save the new type (Cuttler Hammer) for the starter.

The old-type relay needs some looking after to keep it in shape: Dirt, dampness, and corrosion can be the death of it. So keep out these killers by hand tightening the packing-gland coupling-nut (Fig. 25) and then packing water-proofing compound around the gland.

When tightening the coupling nut, first make sure the pressure washer is positioned in the right direction to make snug contact with the packing-gland gasket. The shank of the pressure washer **must** be positioned so it's down against the packing-gland gasket. If the pressure washer is found to be in the reversed position, remove the relay and disconnect the cable from the relay boxes. Then remove the connector end of the cable and put the pressure washer in its proper position.

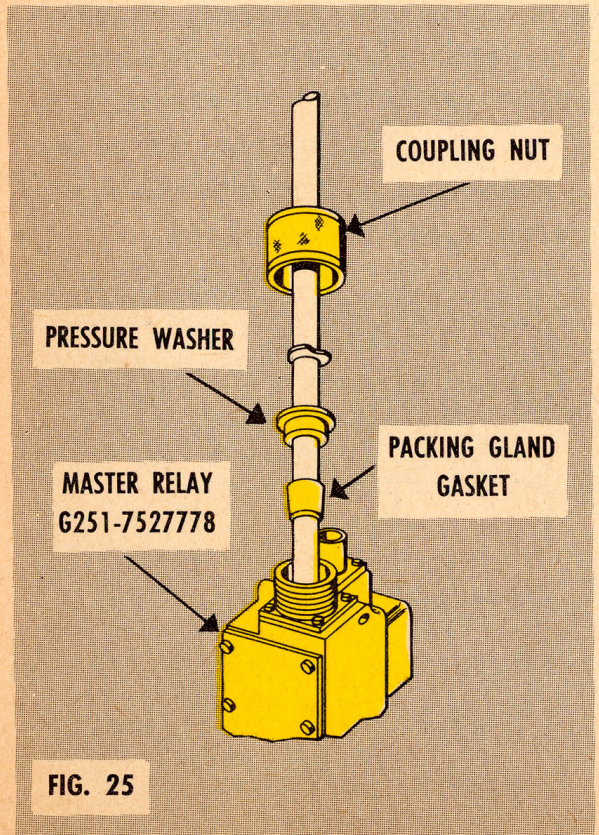


FIG. 25

battery-cables

THE metal covers were put over the batteries to keep the batteries from getting damaged by tools or other heavy objects that may be accidentally dropped by crewmembers or mechanics working in the engine compartment.

The covers were never intended to be a standing or stepping platform. Bending or flexing the battery covers causes the edges of the cut-outs to cut into the cable insulation. This, you don't want to happen —so paint "NO STEP" on both sets of covers.

For extra precaution against shorts, you can tape the cables at points where they pass thru the cover cut-outs and at their terminal lug. Use plastic electrical tape for this job. To keep the center battery-cable from rubbing against other terminals, bend its cable lug approximately 80° (Fig. 26).

The bolts that hold the cover in place should be kept tight. If they come loose,

Starter and Master Relay

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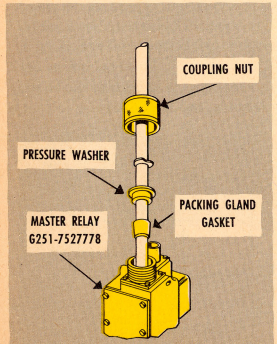

FIG. 25

battery-cables shorting to cover

THE metal covers were put over the batteries to keep the batteries from getting damaged by tools or other heavy objects that may be accidentally dropped by crewmembers or mechanics working in the engine compartment.

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For extra precaution against shorts, you can tape the cables at points where they pass thru the cover cut-outs and at their terminal lug. Use plastic electrical tape for this job. To keep the center battery-cable from rubbing against other terminals, bend its cable lug approximately 80° (Fig. 26).

The bolts that hold the cover in place should be kept tight. If they come loose, the cover can slip to one side and short the battery terminal.

One more safety: There's a rubber pad glued on the underside of the covers to help prevent the cable terminal lugs from chafing and eventually shorting to the cover. If you notice the pad coming loose, reglue it.

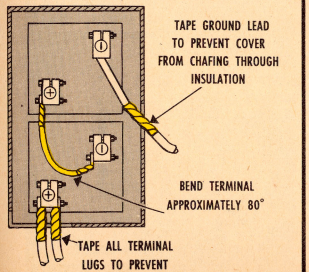

FIG. 26

Neutral Safety-Switch

THERE'S a safety switch mounted on the right side of the range-selector housing—as part of the starting circuit. This switch stays open and prevents starting the tank when the selector lever is in any other range except NEUTRAL PARK. When the lever is in NEUTRAL PARK, it depresses the switch and completes the starting circuit.

Should the starter fail, or if it's possible to start the engine when the range selector is out of NEUTRAL PARK, chances are the switch is out of position. Here's how you can position the switch correctly:

First, disconnect the switch's electrical connectors (Fig. 27). Remove the clamp that holds the cable to the front of the range-selector housing. Remove the jam nut from the threaded end of the switch inside the selector housing, and remove the switch. Then reconnect the two switch cables.

At this point, turn on the master switch (leave magneto switch off) and hold down the starter switch. Put the range selector in NEUTRAL PARK, and have someone slowly screw the safety switch into the housing until the starter begins to crank the engine. Release the starter switch and turn off the master switch, then screw in the safety switch an additional one-half turn and tighten it in that position with the jam nut.

Disconnect the two connecting cables and straighten them out and route them as they should be—then put back the clamp and connect the cables.

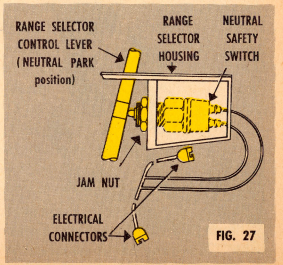

FIG. 27

Neutral Safety-Switch

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shorting to cover

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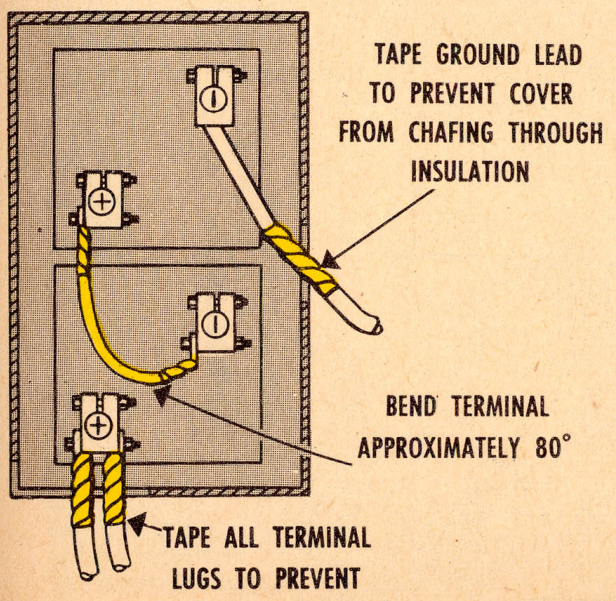


FIG. 26

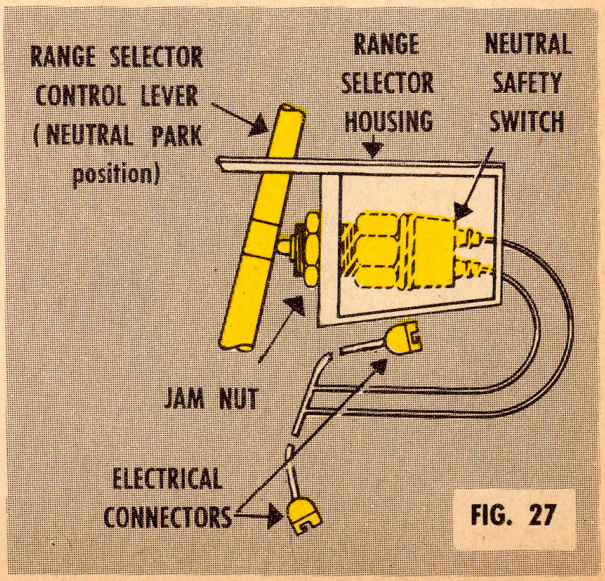


FIG. 27

Voltage Regulator Adjustments

ON THE early model tanks (Manufacturer's No. 675 and under) you'll find an Eclipse main-engine generator-regulator box. Late model tanks (676 and up) have a Delco box. These boxes are interchangeable and are located in the same spot, down on the hull under the turret floor.

The voltage adjustment can be made with a low-voltage circuit-tester (17—T—5575-50) that's been recently calibrated. Hook it up to the slave receptacle. Then start the main engine and turn on the turret-ventilating blower. Run them for 45 minutes. This 45-minute run is extremely important, never cut it short; it's the only way you'll get the regulator to its operating temperature and ready for setting.

On the Delco box, turn the screw that's located on the side that has two terminals (Fig. 28). Turn the screw one way or the other until the tester reads 27.5 volts on the nose and leave it there.

On the Eclipse box, remove the cover and with an insulated screwdriver turn the voltage-regulator-control set-screw that's located on top of the polarized relay-assembly (Fig. 29) till you get 27.5 volts on your meter. Leave the cover off the box until after you've adjusted the auxiliary-engine regulator because after you set Li'l Joe's regulator you must turn the paralleling-circuit adjustment screw clockwise as far as it will go.

To set Li'l Joe's regulator, run it and the ventilating motor for 30 minutes, then remove the cover plate on the relay box that's located on top of Li'l Joe. Now you'll need a long insulated-screwdriver to reach down into the box and turn the regulator's adjusting screw (Fig.

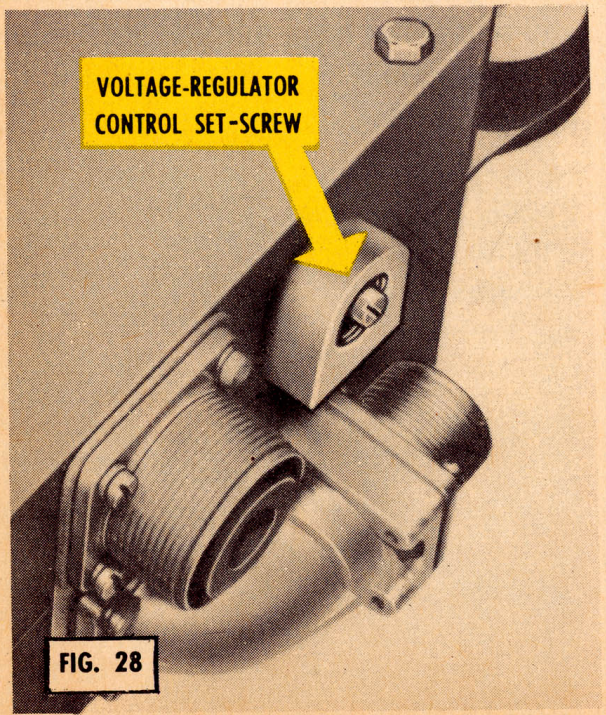


FIG. 28

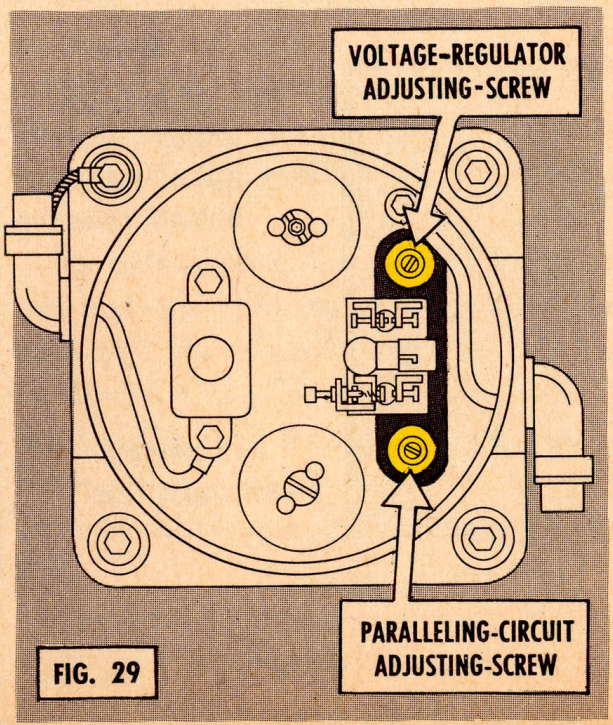


FIG. 29

30) until you again get 27.5 volts on your tester at the slave receptacle.

To save time, you can run the main engine and auxiliary engine at the same time to normalize the temperature of the regulator. But when you're actually making the adjustment, only the engine whose regulator you're adjusting should be running.

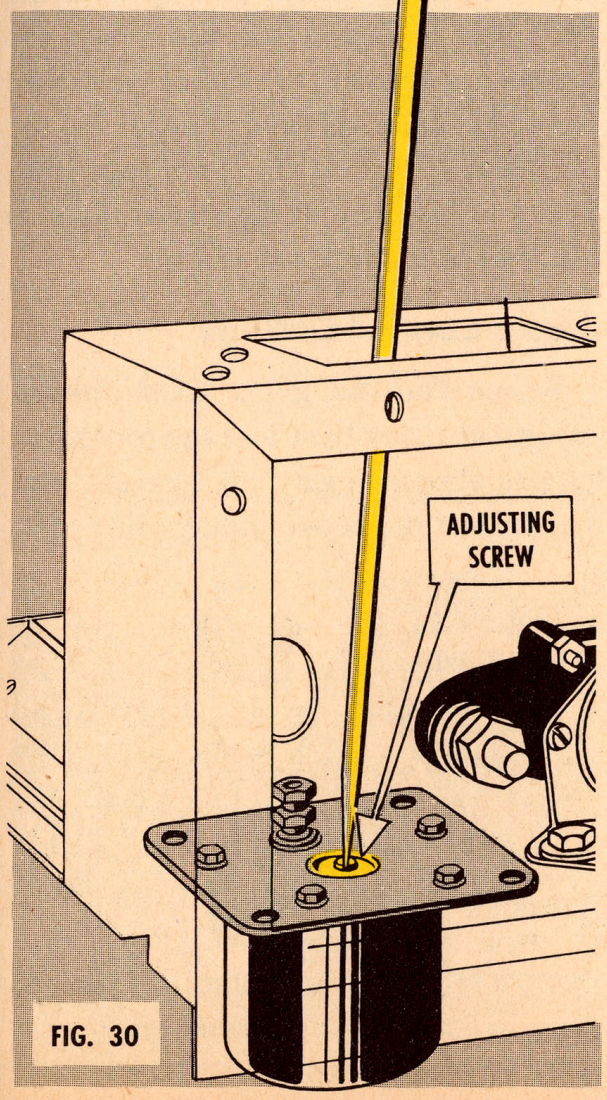


FIG. 30

REGULATORS

REGULATORS on the 41's are carbon-pile-type regulators. Both voltage and current regulators are in the regulator for the main engine. **Never** close either the cut-out relay or the actuating relay by hand when connected to generator and batteries. The contacts will stick and the very high current will damage the generator and regulator before the circuit can be broken.

The regulator for Little Joe does not have a current regulator, but the same caution applies to relay handling.

The voltage setting for regulators should be 27.5 volts. (Only in cold climates, 0° F or below, should the setting be 28.5)

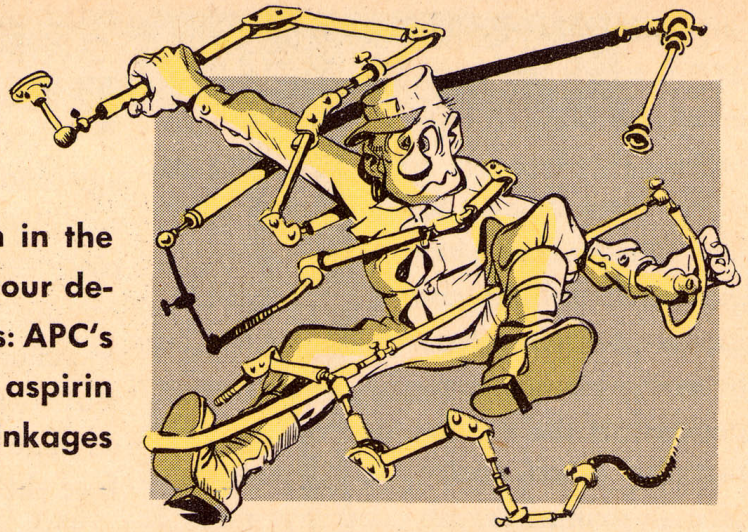
The setting is to be made on open circuit, batteries and all loads disconnected. Run only the engine that drives the generator to be checked.

Engine Generator

It doesn't take much current, passing through the field in the wrong direction, to reverse the polarity. This means that when checking the generator with an ohmeter or a test light, chances are 50-50 you'll reverse the polarity. So before the checked generator gets back in the tank, flash the field to insure correct polarity.

You do this with a low-voltage dry-cell-battery (to minimize arcing). Make a connection between the negative terminal of the battery and the "E" terminal on the generator—then make a momentary connection between the positive terminal of the battery and the "A" terminal on the generator.

LINKAGE



Fouled-up linkages are a pain in the spinal column, but they're in your department so you got two choices: APC's or well-adjusted linkages. The aspirin you can swallow quickly, the linkages take more time.

all about brake adjustments

The brake mechanism itself is a part of the transmission and there's no use working on the transmission-brake cam-ring unless your linkage is well-linked. The first step is to check the brake adjustment at the transmission.

Put a man in the driver's seat to apply and release the foot pedal (pedal should never hit the hull). Remove the brake-adjustment covers at the rear of the transmission. There you'll notice two lines on the cam ring: One is marked "A" (Apply), the other is marked "R" (Release) (Fig. 31). When the brake is released, the metal indicator-plate should line up with the "R" line or nearly so; and when the brakes are applied, the indicator should have the same relative position to the "A" line. If this isn't so, then your linkage or adjustment at the transmission is out, but first check the linkage.

Brake Control Linkage

Before you can get a good linkage adjustment, any bent linkage rods must be straightened—get 'em straight and then adjust the brake linkage like this:

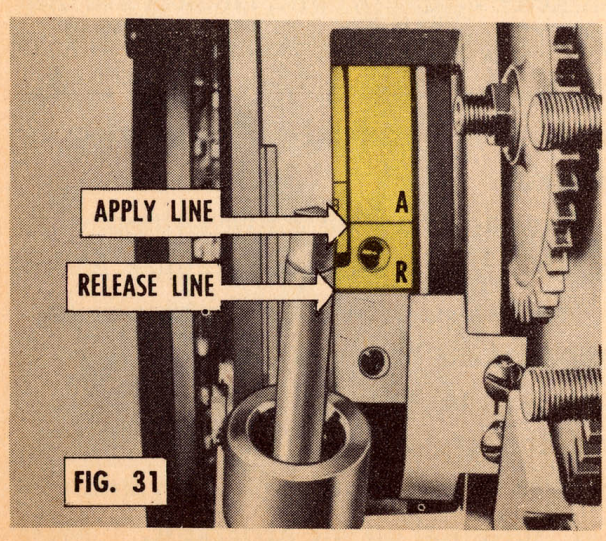


FIG. 31

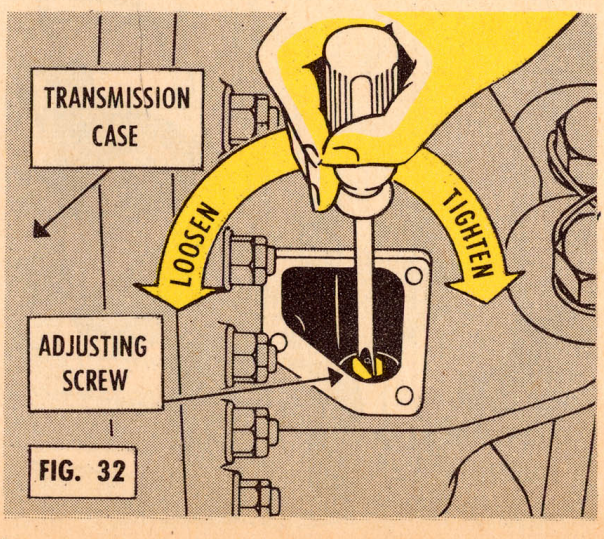


FIG. 32

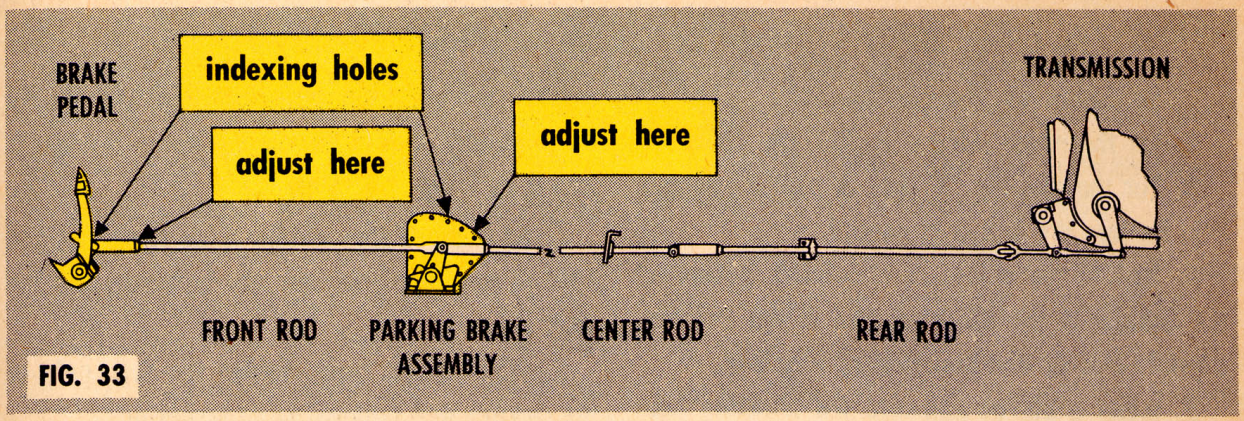


FIG. 33

1. Position the brake pedal all the way up.

2. Disconnect the linkage at the base of the foot pedal and behind the parking-brake assembly (Fig. 33).

3. Insert a pin in the indexing holes that are located at the base of the foot pedal and at the base of the parking-brake assembly.

4. Now, adjust the linkage rods to fit snug between the foot pedal and the transmission—avoid pulling forward on the center rod. This'll tighten the brake discs in the transmission.

5. Now, tighten the locking nuts and remove the indexing pins.

Brake Cam

To adjust cams in the transmission, use a screwdriver (Fig. 32). Apply the brake pedal, glance at the "A" line—if it isn't opposite the indicator, release the brake pedal and turn the adjusting screw (clockwise to take up the brakes, and counter-clockwise to release) and keep doing this until the "A" line is dead opposite the indicator (Fig. 31). When the pedal is released it should be dead on the "R" line. Always complete the adjustment in a **clockwise** direction—this'll remove free play from the adjusting mechanism.

When making your final check for adjustment be darn sure your brake pedal is fully released—if it isn't, your brake cams will drag during the operation—then you'll be back where you started.

When the brakes are set, put the covers back on, but make sure the slot of the adjusting screw is set to take the angle cover's angle-plate. This angle-plate is what keeps the screw from vibrating out of adjustment.

Parking Brake

The brakes should release when you move the range selector out of NEUTRAL PARK; it they don't, then check the trigger pin in the parking-brake assembly. The trigger pin should have a minimum travel of 7/16″ and should operate freely. (The parking brake is locked when the trigger pin's at the rear; free when the trigger is at the front.) If the pin doesn't operate freely, remove the latch cover and check the roller, the quadrant, and the wedge block for wear, corrosion, and dirt. Free them up or, if they're too far gone, replace them. An after-thought . . . before working on the brakes, place the tank on level ground—once it starts to roll, it's hard to stop.

how to adjust the STEERING CONTROL LINKAGE

1. Straighten all bent linkage-rods.
2. Set the range selector in NEUTRAL PARK.
3. Put the steering "T" bar in neutral—wiggle it to be sure it's locked in neutral.
4. Back in the engine compartment, disconnect the linkage at the bellcrank and at the steering-control valve on the transmission (Fig. 34).
5. Insert a pin or nail thru the indexing hole located in the bellcrank assembly.
6. At this point, the steer-valve indicator should automatically point to the neutral dot. If it doesn't, turn it by hand until it does.
7. Now adjust the linkage to fit snug (not too tight or too loose) between the bellcrank and the steer valve.
8. When it fits snug, tighten the lock nuts at the clevises and remove the indexing pin.

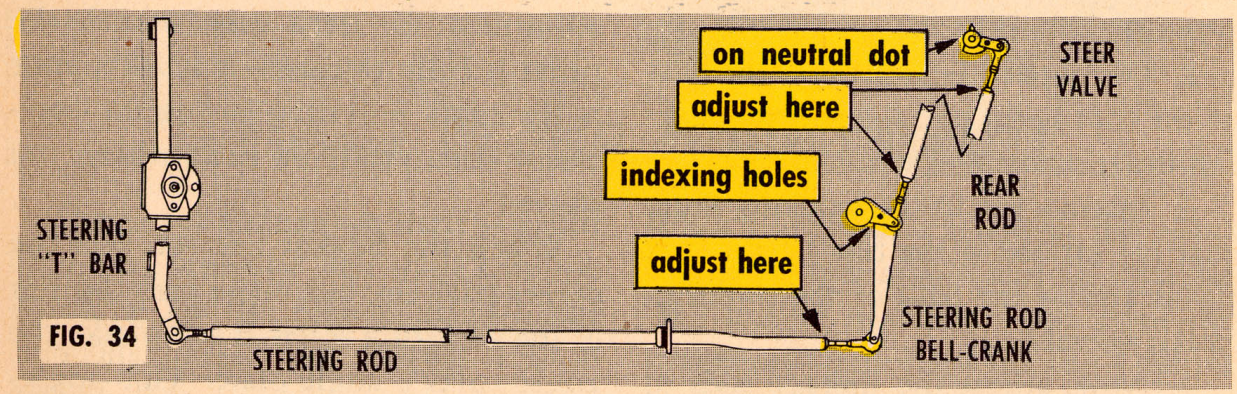


FIG. 34

how to adjust the RANGE-SELECTOR-CONTROL LINKAGE

1. Look for bent rods—if you find any, straighten them.
2. Set the range selector in HIGH gear.
3. Disconnect the linkage at three places: at the front bellcrank just behind the driver's seat, at the rear bellcrank that's in the transmission compartment and at the shift-control valve on the transmission (Fig. 35).
4. Insert a pin or a nail thru the indexing holes in both bellcranks.
5. Make the shift-valve-control indicator point to the high dot by hand turning it.
6. Now adjust the overall linkage to fit snug between the two bellcranks and the selector-control valve. Make linkage snug—too tight or too loose will throw you out of adjustment again.
7. Tighten the locking nuts on the clevises where you've made the adjustment, then remove the indexing pins.

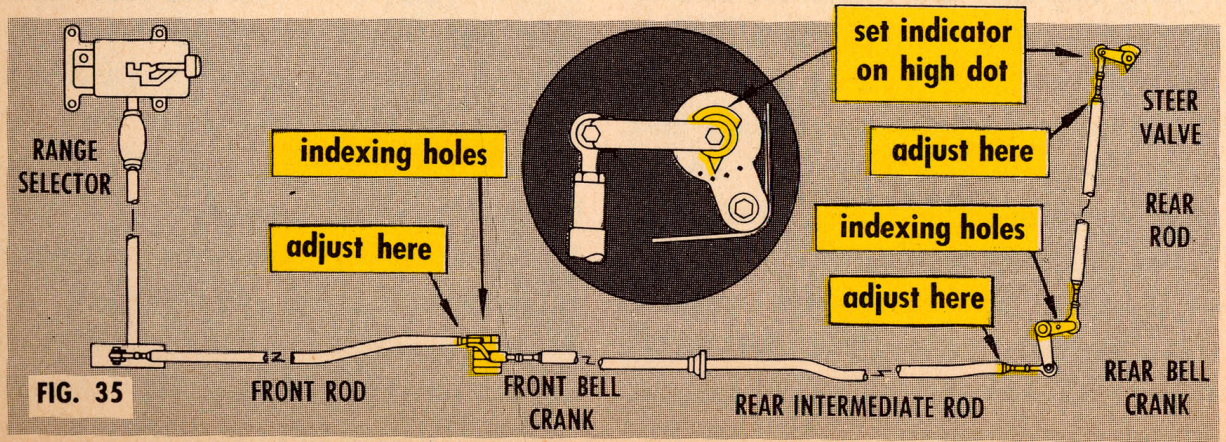


FIG. 35

SPASMODIC PERSONNEL-HEATERS

IF the heat exchanger in your 24-volt South Wind personnel-heater overheats and causes the overheat switch to periodically turn-off, or if the heater isn't functioning like it should, it's because the burner-pocket baffle has warped and changed the flow of combustion air and formed hot-spots. (Heaters after Heater Serial No. 61055 were modified in production.)

Folks way up in the Arctic modified their heaters for maximum efficiency (Fig. 36), and here's how Ordnance can modify yours:

1. Remove the air-blower-motor assembly and the igniter.

2. Take a used igniter, remove all the inside parts, and bore a ½" hole through the center line of the igniter-shell.

3. Place the drilled igniter-shell in the igniter well, to serve as your drill bushing and guide.

4. Drill a ½" hole through the baffle plate (it's about 2" inside the exchanger burner-pocket).

5. Remove the improvised bushing guide. Insert a solid rod (about 11/16" in diameter) thru the hole until it touches the baffle plate, and then tap the rod with a hammer until the baffle is sprung inward from about ¼" to ⅜" toward the center of the exchanger. (A 10" extension from a ½" drive-socket set will do as a substitute for the rod.) The baffle is tack welded—so go easy on the tapping. And before reassembling, check the welds.

6. To determine the correct distance to move the baffle, first insert the rod in the hole and mark it (with a colored pencil) even with the edge of the igniter well. Make another mark about ⅜" out from the first, then tap the rod until the second mark is in line with the edge of the igniter well.

7. Reassemble the heater and it'll be rarin' to go.

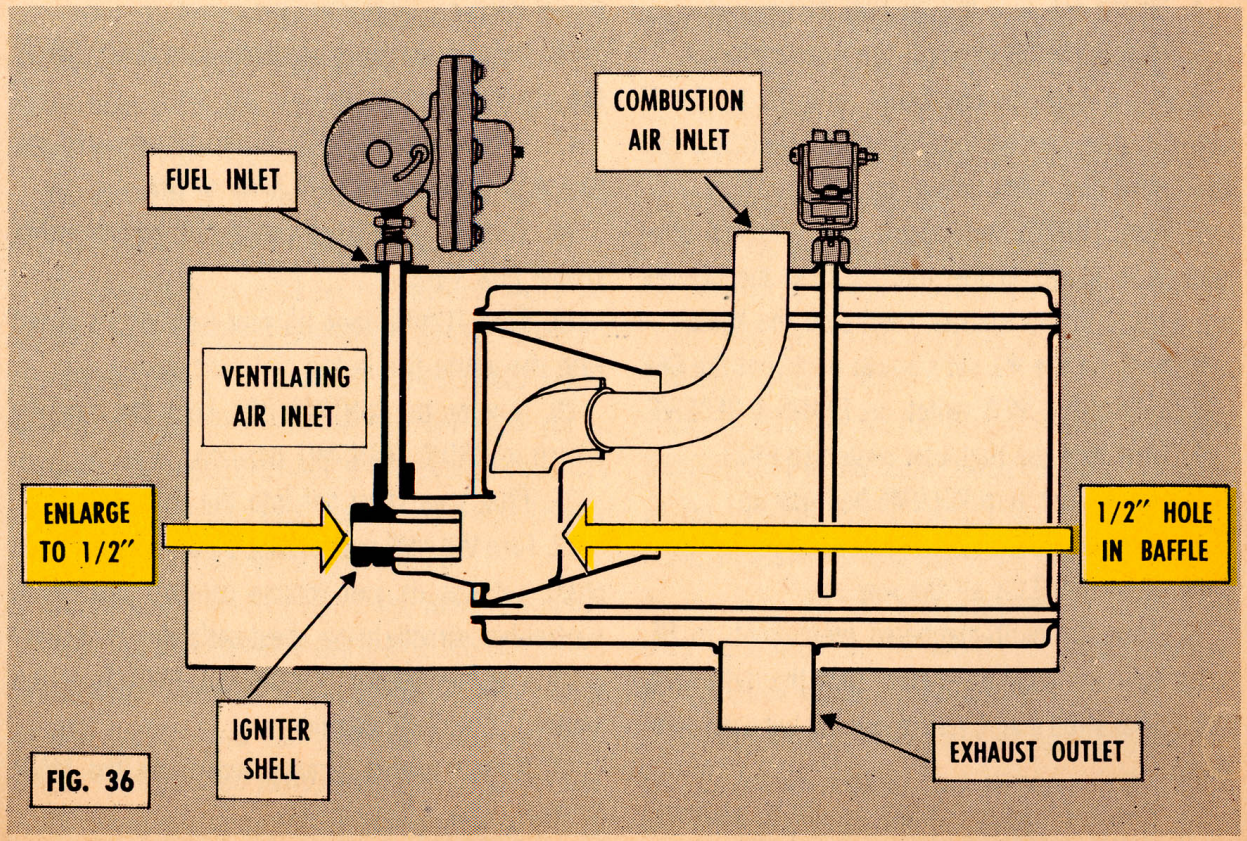
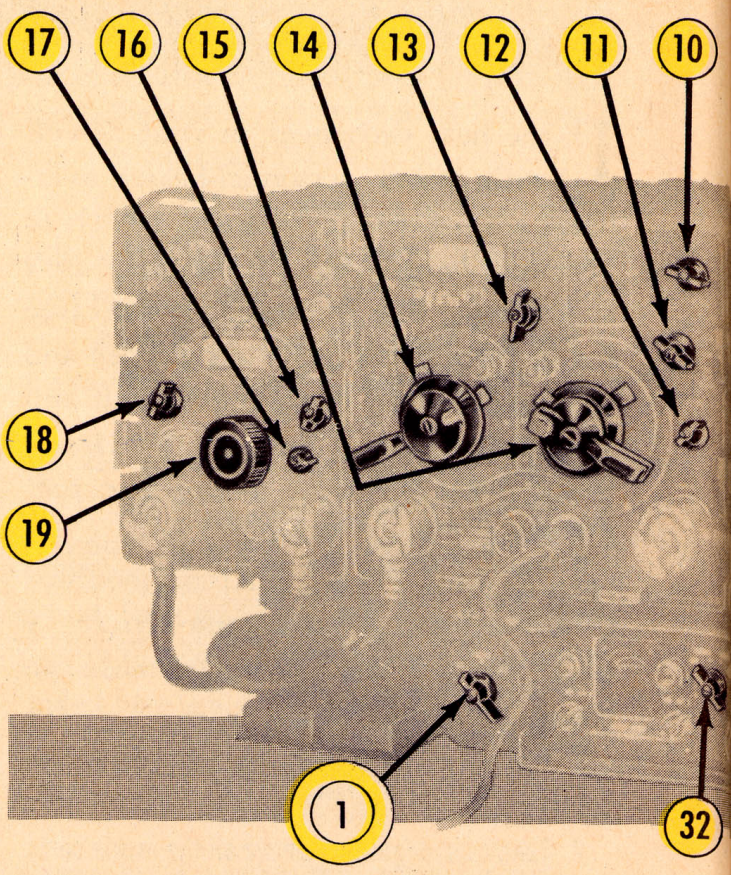


FIG. 36

RADIO



The radio in most T41's consists of a #1 set for command communication, with an auxiliary receiver and a range up to 10 miles; a #2 set keeps in touch with the infantry, its range is about a mile.

The procedure here on how to turn it on and operate it clarifies the TM by this display arrangement that's easier to remember. **First:** If the radio's to be on for any lengthy period, make sure one of the engines is running (preferably the auxiliary). Check the antenna connections, and see that the power input and control cables are plugged-in snug—not too tight or you'll break the pins. **Then . . .**

1. Keep MAIN SWITCH off (OFF-REMOTE-ON) till your radio's set.

2. Put amplifier's OFF, INT, RT-70 switch on RT-70. (Use INT for interphone operation only.)

3. Turn VOLUME clockwise as far as it'll go.

4. On #2 set, turn the VOLUME half-way up.

5. Turn SQUELCH knob all the way clockwise.

6. If you need the dial lights, turn ON the MAIN SWITCH, then turn **on** the DIAL LIGHT switch. If you don't need dial lights, leave 'em OFF.

7. Turn TUNING knob until your channel (frequency) is alined in the window. (Full megacycles are marked in the window, tenths on the knob.)

8. Next, on the #1 set's power pack, put the OFF—REC—TRANS & REC switch on TRANS & RECEIVE.

9. Then turn the High-Low switch to HIGH.

10. On #1 set, turn VOLUME half-way up.

11. Turn on DIAL LIGHT if you need it.

12. Turn SQUELCH all the way up.

13. Turn the multi-numbered meter-knob to RF.

14. Now set your frequency. Turn the (left) TUNING handle a full megacycle (never set between numbers.)

15. Turn the (right) TUNING handle to whatever tenth of megacycles you need. NOTE: to take handle off detent (clicks), turn extreme counter-clockwise; to put back on clicks, turn clockwise.

16. Now on the spare receiver: Turn SQUELCH all the way up (clockwise).

17. If your MAIN SWITCH is **on** and you need the dial light, turn DIAL LIGHT knob to ON.

18. Turn VOLUME knob about half-way up. (Dial should now light.)

19. Turn TUNING knob till your frequency's alined with the white line in the dial window.

20. Now on the CONTROL BOX: Lock the transmit switch in RADIO TRANSMIT position.

21. Plug your chest set into the control box.

22. Turn VOLUME control knob all the way up. (Each chest set has its own volume control, located on control box directly below chest-set's plug-in socket.)

23. Put the SELECTOR CONTROL SWITCH in the center (12 o'clock) position.

24. If you haven't already turned on the MAIN SWITCH, now is the time (1).

RADIO

The radio in most T41's consists of a #1 set for command communication, with an auxiliary receiver and a range up to 10 miles; a #2 set keeps in touch with the infantry, its range is about a mile.

The procedure here on how to turn it on and operate it clarifies the TM by this display arrangement that's easier to remember. **First:** If the radio's to be on for any lengthy period, make sure one of the engines is running (preferably the auxiliary). Check the antenna connections, and see that the power input and control cables are plugged-in snug—not too tight or you'll break the pins. **Then** . . .

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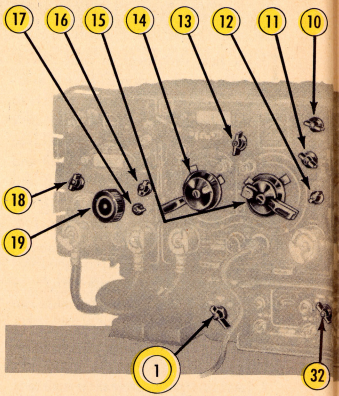

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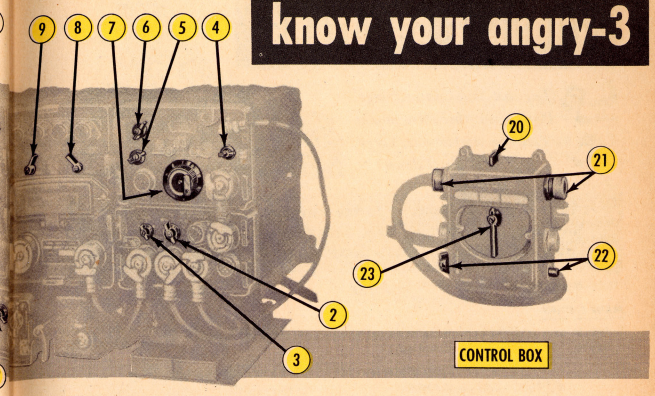


25. Set all three SQUELCH knobs (5, 12, 16). Turn each one counter-clockwise till you hear a rushing noise, then back off a fraction. This noise indicates your set's functioning. If you back off more than necessary to squelch the noise, you'll cause weak signals to be lost.

26. Now you're on the air. Set the volume knobs (4, 10, 18) on all sets for good reception.

27. To talk or receive on #1 set and spare receiver, turn control-box-selector handle counter-clockwise, then press and hold in HOLD AND RADIO buttons on your chest set—release 'em when you're through. With control switch in this position you can also talk and receive over the interphone system by holding in the chest-set's HOLD button.

28. To talk or receive on #2 set, turn control-box selector-switch clockwise and hold in the HOLD AND RADIO buttons on your chest set. With control-switch in this position you can also talk over the interphone. Hold in HOLD button to talk, release to hear.

29. When you're not using any special set, keep the control-box selector-switch in the center position. This lets you listen on all the sets, and will let you talk over the interphone.

30. After you're on the air, the only adjustments on the sets that you'll need to fool with are the tuning, volume-level and squelch. Adjust either of them as the occasion demands.

31. If you want to use the interphone system only, turn the RT-70 switch to INT (see step 2).

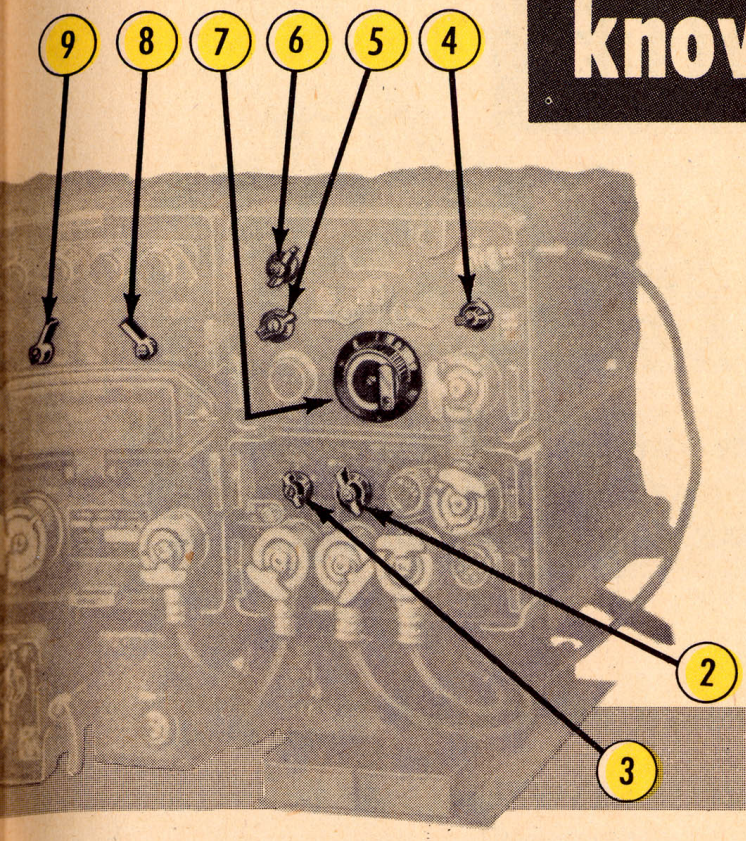
32. When you're not using the retransmission unit—keep it turned **off.**

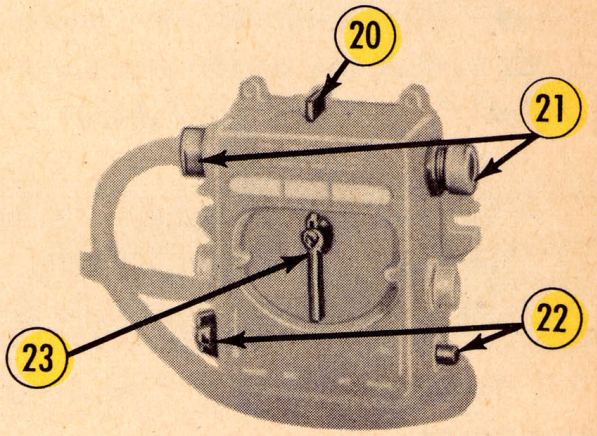
33. To turn the set off, simply turn off the MAIN SWITCH; (OFF-REMOTE-ON) when you're ready to go on the air again turn it **on,** and you're all set (1).

34. If you're curious about all the other gismos on the sets, dig out your copy of TM 11-284 and bone up a little on the subject . . . page 64 covers the complete operating procedure.

The sooner you wise-up to your ANGRY-3, the better. It's a nice thing to have around . . . the fights and the world series are on the air.

know your angry-3





CONTROL BOX

25. Set all three SQUELCH knobs (5, 12, 16). Turn each one counter-clockwise till you hear a rushing noise, then back off a fraction. This noise indicates your set's functioning. If you back off more than necessary to squelch the noise, you'll cause weak signals to be lost.

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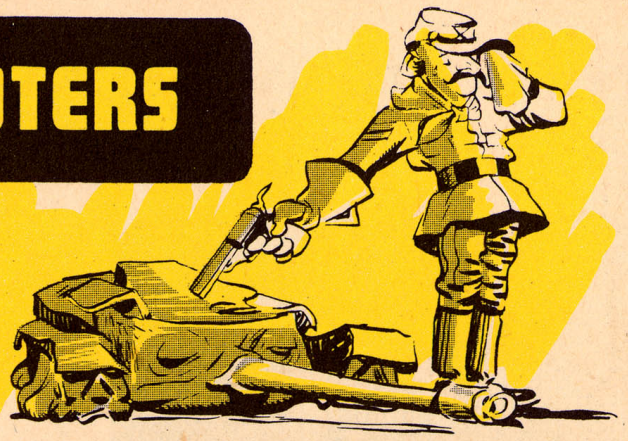
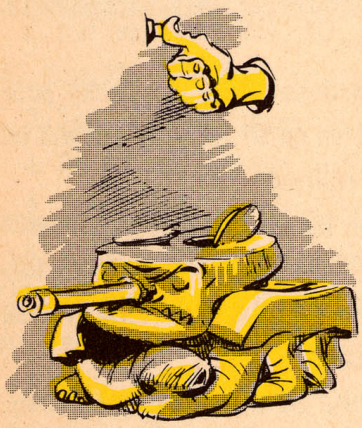
TROUBLE SHOOTERS

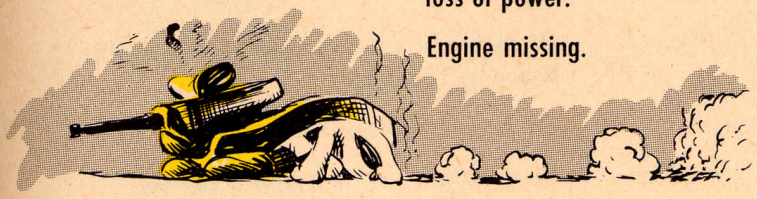
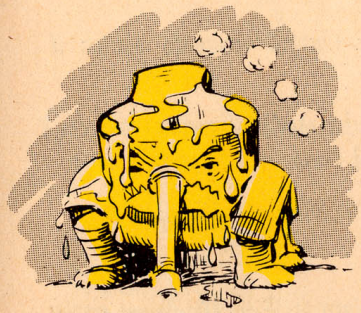


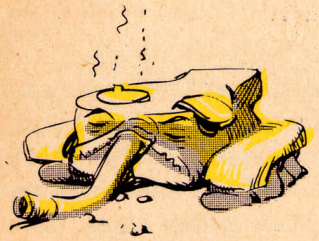
Lay that pistol down, Sarge
Don't shoot that there mount
Tain't so simple now, Sarge
Lay that pistol down

Times have changed — Today's mechanized mounts need more than a shot or two. These trouble-shooters listed below will help you get a lame mount to rear-up and go.

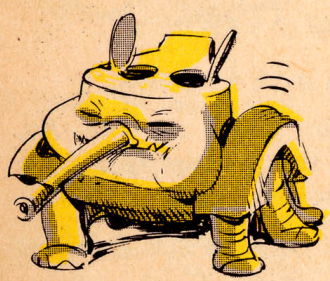
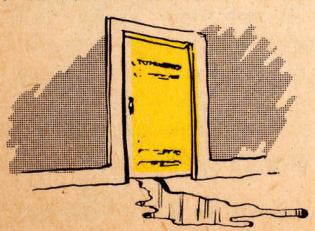
TROUBLE	CAUSE	REMEDY
MAIN ENGINE		
1. Fails to crank when starter's held on.	Master switch not turned on, or burned out.	Switch on, or replace.
	Range-selector lever not in neutral.	Shift into NEUTRAL PARK.
	Range-selector safety-switch misalined or burned out.	Replace or realine. (see page 647)
	Master or starter relay burned out.	Check and replace. (see page 646)
	Faulty starting system.	Check starting system (check circuit).
	Faulty battery system.	Test batteries and starting circuit.
	Mechanical seizure of engine parts.	Go get Ordnance.
	Wrong grade of oil.	Drain and refill as per LO 9-730.
2. Cranks, but fails to start.	Magneto switch not on BOTH.	Get it on.
	Booster switch not on.	Get it on.
	Fuel-tank shut-off-valve not open.	Get it open.
	Fuel tanks empty.	Get gas.
	Engine flooded due to over-pumping primer.	Turn off magneto switch, push accelerator down to floor and turn over engine about five times to exhaust surplus gas. (see page 626)
	Engine extremely cold.	Additional use of pump required (pump only while engine cranking with mags on). Primer should have about 10 psi resistance; if not, indicates broken pump lines—if more, pump is defective or fuel lines clogged.

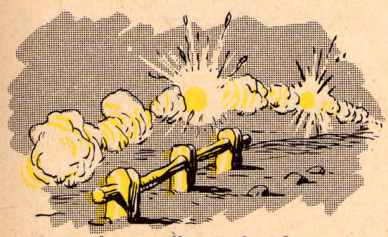


TROUBLE	CAUSE	REMEDY
	Weak batteries.	Replace or charge with auxiliary generator or slave cable.
	Engine oil too heavy.	Change oil according to LO 9-730.
	Fuel not reaching carburetor.	Disconnect carburetor inlet-fuel-line, crank engine (magnetos off). If free flow of gas comes out, fuel pump is OK. If not, check fuel system.
	Current not reaching spark plugs.	Remove spark-plug cable, test spark jump. If no spark, what can do? Go get horse.
3. Starts but won't keep running.	Many different factors cause loss of power.	Peform quarterly PM service, or volunteer for KP.
	Engine missing.	Remove spark-plug cable and test spark jump (use tubular wrench). If spark won't jump 3/16″ gap, or is irregular, or none at all, cable or magneto is at fault. Inspect all plugs, test compression. Check ignition timing. Check for too lean fuel mixture.
4. Loss of power—or doesn't develop full power.	Brakes dragging.	Brakes too tight. Readjust.
	Improper ignition timing.	Check ignition timing.
	Clogged air cleaners.	Clean air-cleaner filters.
	Worn internal parts.	Noticed by smoky exhaust, fouled plugs, excessive oil consumption. Go get Ordnance.
	Throttle linkage out of adjustment.	Check and adjust throttle linkage.
5. Overheating	Idling at 650-rpm for long periods.	Idle at 800-1000-rpm.
	Low oil level.	Check level and add oil.
	Wrong grade of oil.	Drain and refill per LO 9-730.
	Faulty cooling fan.	Check fan, repair clutch if necessary.
	Oil-cooler tubes clogged or radiators obstructed.	Remove rags, dirt, leaves, etc., from fins. Check circulation through cooler by removing outlet line and cranking engine.
	Defective oil pump.	Check oil pressure. (Should be 60 to 70 psi with OE 50.)
	Faulty driving (stalling under hard pull and not stopping to cool engine).	Check driver. Replace if defective. Operate per instructions TM 9-730. Cool engine by placing in neutral and running at 1700-rpm for few minutes. (Before doing this check oil lines for leaks).
	Engine shrouds not installed correctly.	Check installation. Shrouds and hinged plates should direct flow of air around engine.
	Transmission slipping.	Check stall speeds (should be 2300-2400-rpm in high.)

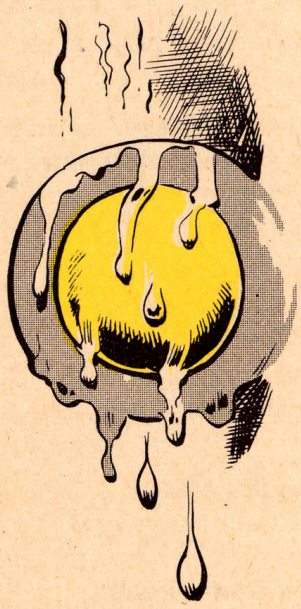
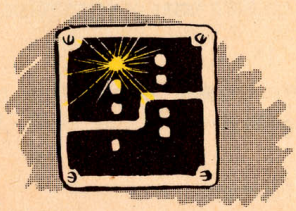
TROUBLE	CAUSE	REMEDY
6. Excessive oil consumption.	Wrong grade of oil.	Check LO for correct viscosity for prevailing atmospheric temperatures. Drain and refill.
	Oil leaking.	Check for leaks—repair 'em.
	Worn internal parts.	(Noticed by smoky exhaust, loss of power, fouled plugs.) Go get Ordnance.
7. Low oil pressure.	Wrong grade of oil.	Check LO. Drain and refill if necessary.
	Diluted engine oil.	Do not overprime. Change oil every 1000 miles or as often as conditions require.
	Faulty oil pump.	Replace it.
	Bad connecting-rod bearings.	(Identified by excessive rattling or knocking.) Holler for Ordnance.
	Faulty pressure gage.	Check gage. Replace if necessary.
	Faulty warning-light switch.	Check, replace switch or bulb if needed.
	Dirty pressure-control-valve seat.	Remove and clean valve seat.
8. High oil pressure.	Clogged oil filter.	Clean as per page 621.
	Improperly adjusted or faulty oil-pressure valve.	Adjust or replace control valve.
	Faulty oil pressure gage.	Replace gage.
9. No oil pressure.	No oil in crankcase.	Plug hole in head.
	Clogged oil-cooler tubes.	Go get Ordnance.
	Faulty oil pump.	Go get good one.

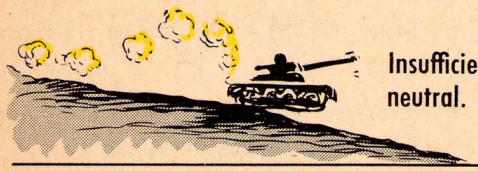
FUEL SYSTEM

1. Fuel not reaching carburetors.	Fuel-tank shut-off valve closed.	Get it at BOTH ON.
	Fuel tanks empty.	Hide red face.
	Degasser switch defective.	Check for short, replace magneto switch if necessary.
	Clogged fuel lines or filter.	Check pump-to-carburetor line, replace if necessary. Remove and clean fuel filter.
	Fuel leaks.	Examine for broken lines, repair or replace.
2. Carburetor floods.	Too much pumping of accelerator.	Never pump accelerator. **Repeat:** Never pump accelerator.
	Faulty fuel pump.	Check pump pressure. At 700-rpm: minimum 3½ psi, maximum 6 psi. Replace pump if needed.
	Defective carburetor.	Float adjusted wrong or needle valve faulty—replace carburetor.

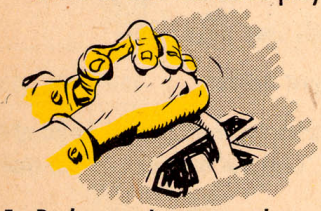
TROUBLE	CAUSE	REMEDY
3. Fuel mixture too lean.	Carburetor needs adjusting.	Adjust idle screws for maximum performance at 650-rpm. (see page 622)
	Faulty fuel-pump pressure.	Check pump for 3½ psi at 700-rpm. Replace if necessary.
	Air leaks.	Check carburetor and hot-spot manifold-flange gaskets for leaks. Tighten or replace.
4. Fuel cut-off-switch (degasser) won't stop engine.	Faulty switch.	Replace switch.
	Faulty degassers.	Check degasser cables at carburetors for current. If defective, go get Ordnance.
	Faulty circuit breaker.	Check. Replace if necessary.

TRANSMISSION

1. Overheating (warning light on).	Low, or no oil.	Check level; Engine at 1000-rpm and transmission at normal operating temperature, level should be between MIN OPERATING LEVEL and DO NOT FILL ABOVE THIS LINE marks on dipstick.
	Wrong oil in transmission.	Always use OE 10.
	Clogged or dirty oil filter.	Clean filter (always clean it 25 miles after oil change).
	Clogged cooler cores or lines.	Remove and clean.
	Fan shrouds installed wrong.	Check. Shrouds should direct air through coolers.
	Faulty warning-light switch.	Check. Replace if necessary.
	Transmission slipping.	Check stall speeds (see page 636).
	Brakes too tight.	Check and readjust brakes.
	Faulty driving (stalling under hard pull and not stopping to cool transmission).	Shift into neutral and run engine at 1700-rpm for few minutes. Look for oil leaks before cooling engine.
	Leaky oil lines.	Check for oil leaks.
2. Low-oil-pressure light comes on.	Faulty lubrication oil pressure.	Remove hex-head pipe-plug (at front center, to left of high-range oil-pressure-plug on control-valve body. Insert 200 lb pressure gage. With engine running at 1600-rpm, oil pressure should register 30 psi. If below 15 psi, go get Ordnance.
	Low oil level.	Check. Add oil if you need it.
	Faulty light switch.	Check. Replace if necessary.
3. Tank fails to drive in some or in all ranges.	Selector-control linkage out of adjustment.	Check it, like it says on page 652.
	Transmission slipping.	Run stall speeds in high range. If tachometer hits 2800-rpm, go get Ordnance.

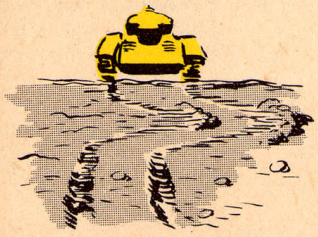
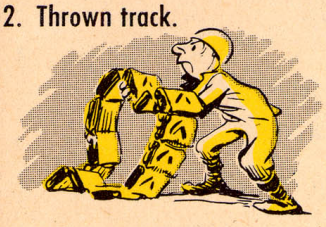
TROUBLE	CAUSE	REMEDY
	Main-oil-line pressure not in allowable range.	Check. Pressure should be 175 psi (transmission in low or reverse) with engine running at 1600-rpm.
	Insufficient oil pressure in neutral.	Check. Pressure should be not less than 60 psi with engine running at 1600-rpm. If below, go get Ordnance.

DRIVER CONTROLS & LINKAGE

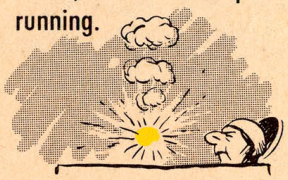
1. Tank won't steer.	Range selector control and transmission-valve body out of synchronization.	Synchronize manual-control lever with transmission-valve body.
	Transmission oil pressures not in operating range.	Make transmission oil-pressure test. If not in operating range, go get Ordnance.
	Defective steering linkage.	Adjust steering linkage.
2. Tank steers in only one direction.	Steering linkage at valve body improperly adjusted.	Check and adjust linkage. (See page 652.)
	Insufficient oil pressure in right or left steer valve.	Check. If not in allowable range, go get Ordnance.
	Brakes dragging.	Check service-brake adjustment on both sides of transmission. Check and adjust brake linkage.
3. Range-selector contol-lever sticks in neutral or reverse.	Control-lever rod out of adjustment.	Adjust rod and linkage.
4. Range-selector control-lever binds or has excessive play. 	Steering and shifting linkage out of adjustment.	Adjust to eliminate looseness.
	Loose bellcranks on shift linkage.	Replace connecting parts.
	Bent steering and shift controls at transmission.	Straighten or replace linkage.
5. Brake won't stop tank.	Linkage out of adjustment.	Check, adjust. Eliminate all play.
	Brake out of adjustment at transmission.	Adjust service brakes at transmission.
6. Brakes dragging.	Brakes out of adjustment at transmission.	Check and adjust on both sides of transmission.
	Linkage bent or too tight.	Check for defective linkage. Straighten or replace what you gotta.
7. Primer handle pumps too easy.	Broken pump lines.	Check, repair as necessary.
	Defective pump.	Check, repair, or replace.
	Clogged filter or fuel lines to pump.	Check, repair, or replace.

TROUBLE	CAUSE	REMEDY
8. Engine won't respond to accelerator or hand throttle.	Loose or broken throttle linkage.	Check, straighten, repair or replace.
	Bent linkage.	Check, repair or replace as necessary.

TRACKS AND SUSPENSION

1. Tank leads to one side.	Unequal track tension.	Adjust **both** tracks so they'll be equal.
	Worn or distorted drive sprockets or tracks.	Check for worn parts, replace if necessary.
	Crowned road.	Drive in the middle, or see Commissioner of Roads, or use yer shovel.
2. Thrown track.	Improper driving.	You doing the driving?
	Worn or excessively loose track.	Adjust or replace track.
	Broken compensating idler-wheel.	Check inner disc's guide-flange for excess wear. Interchange discs or replace. (see page 614)
3. Tank sags to one side.	Broken torsion bar.	Replace if road wheel can be lifted with crow bar.
4. Excessively hard riding.	Leaking shock absorber.	Test by feel. It should feel warm after running tank. Replace if needed.
	Broken torsion bar.	Replace as per page 615.

AUXILIARY ENGINE

1. Fails to start.	Defective magneto switch or starter wiring.	Start manually, if it starts, check starter wiring and switch; if it won't, check magneto switch and wiring.
	Worn or fouled plugs.	Remove and clean. Replace if necessary.
	Magneto breaker-points out of adjustment.	Adjust to 0.0015″ gap when marks are in line.
2. Starts, but won't keep running.	Fuel shut-off-valve closed.	Open it manually.
	Clogged filter or fuel lines.	Remove glass bowl and clean. Check lines for leaks, kinks, and clogging.
	Damaged fuel pump.	If flow from pump's inadequate, replace pump.
3. Won't run efficiently at full speed.	Governor improperly adjusted.	Check for final speed adjustment.
	Engine missing.	Check plugs, spark-plug cables, and magneto points. If still missing, notify G2.

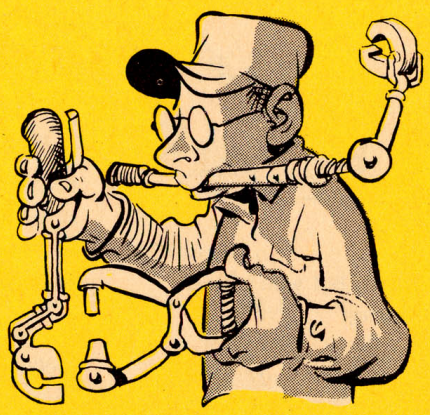
SPECIAL TOOLS

you'll need for organizational maintenance

Tool Set, Organizational Maintenance, Special, **Set A,** Basic (T41E1, T141) 41-T-3568-338

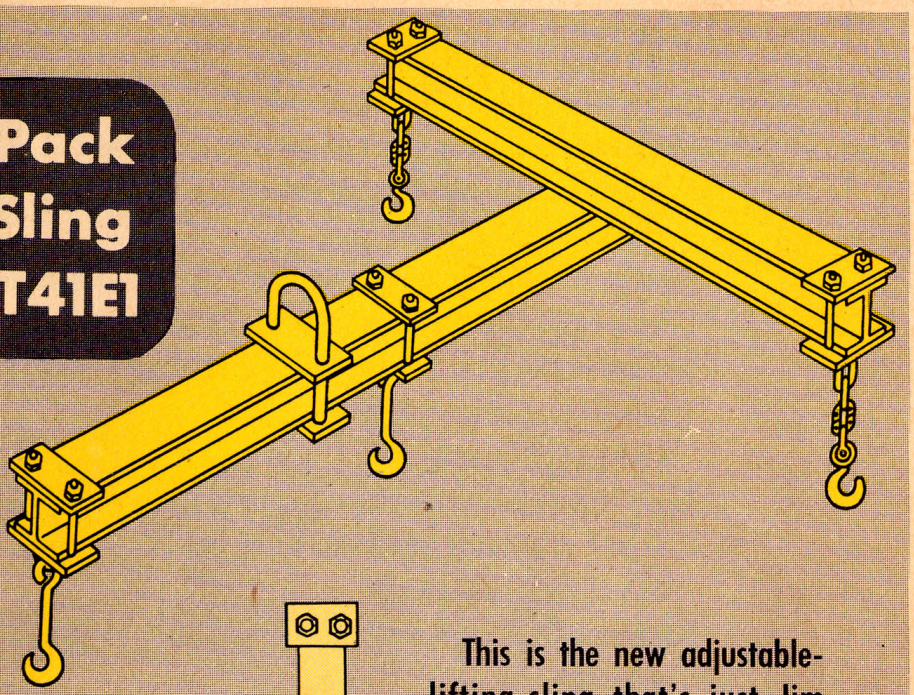
Tool Set, Organizational Maintenance, Special, **Set B,** Basic (T41E1, T141) 41-T-3569-338

	Components	STOCK NUMBER	ORDNANCE NUMBER	SET A	SET B
Engine	Kit, extension, electrical cables and fuel line.	41-K-86-880			1
	Wrench, socket, oil filter by-pass valve and valve and oil pressure control valve.	41-W-3727-33			1
	Gage, valve tuppet adjusting.	41-G-415-375			1
	Light, magneto timing, (less battery).	41-L-1439			1
	Sling, lifting, engine and transmission.	41-S-3832-22			1
	Wrench, crowfoot, ignition harness nut.	41-W-871-62		2	2
	Wrench, crowfoot, engine turning, from fan.	41-W-871-90		1	1
	Wrench, spline engine turning, from flywheel.		8389952	1	1
	Wrench, open end, oil cooler hose nut.	41-W-1593-600		1	1
	Wrench, spark plug, tubular.	41-W-3297-50		2	2
	Stand, transport, engine and transmission.	41-S-4942-125			1
	Adapter Set, Electrical Testing (used with Adapter Set 17-A-3150)		8375193	1	2
	Consists of:				
	1 Adapter (2 pin)				
	1 Adapter (6 pin)				
	1 Adapter (3 pin)				
	1 Adapter (12 pin)				
	1 Adapter (3 pin)				
	1 Adapter (3 pin)				
	1 Adapter (12 pin)				
	2 Leads, test				
	1 Box, adapter set				
Transmission	Gage, transmission oil pressure	45-G-1127-500			1
	Sling, lifting, transmission	41-S-3832-165			1
Auxiliary Generator	Gage, float level (Carburetor)	41-G-185-350			1
Suspension	Adapter, puller, road wheel arm ass'y.	41-A-18-41			1
	Adapter, puller, compensating link pin.		8375338	1	1
	Adapter, puller, torsion bar.		7083703		1

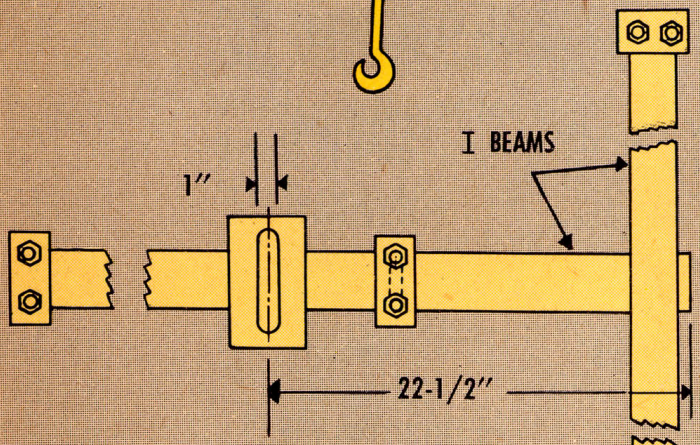


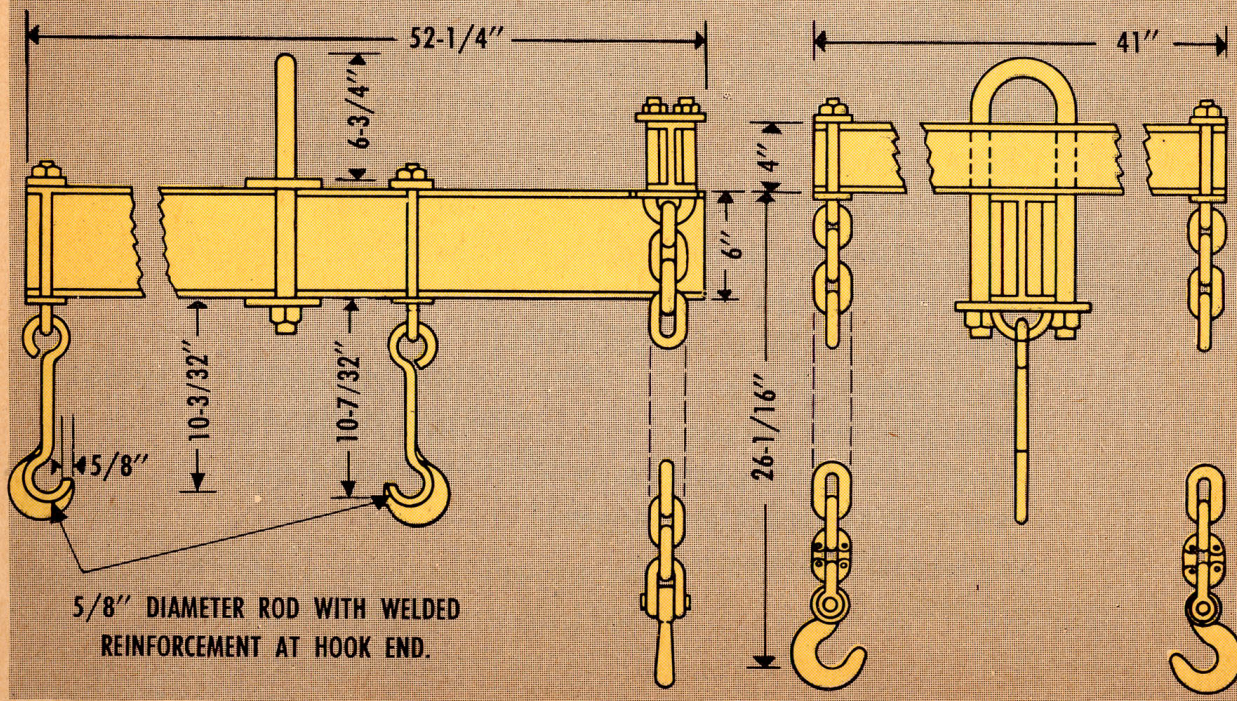
	Components	STOCK NUMBER	ORDNANCE NUMBER	SET A	SET B
	Puller, screw-type, shock absorber end.	41-P-2951-175		1	1
	Puller, slide hammer (road wheel, arm ass'y, torsion bar and compensating link pin)—used with 41-A-18-14.	41-P-2957-33		1	1
	Remover and Replacer (bearing cup, track support roller hub)—used with 41-H-1396-507 Handle.	41-R-2374-620		1	1
	Remover and Replacer (bearing cup, compensating hub and road wheel hub, inner)—used with 41-H-1396-507 Handle.	41-R-2374-630		1	1
	Remover and Replacer (bearing cup, compensating wheel hub and road wheel hub, outer)—used with 41-H-1396-507 Handle.	41-R-2374-652		1	1
	Replacer, oil seal, compensating wheel and road wheel hub.	41-R-2392-67		1	1
	Replacer, oil seal, road wheel arm support housing—used with 41-H-1396-510 Handle.	41-R-2393-650			1
	Replacer, track support roller hub, oil seal.	41-R-2393-802		1	1
	Replacer, bearing, shock absorber.	41-R-2382-803		1	1
	Pin, drift, track pin.	41-P-615-300		1	1
	Fixture, track connecting (T91E3 track).	41-F-2995-165		2	2
	Handle, remover and replacer.	41-H-1396-507		1	1
	Handle, remover and replacer.	41-H-1396-510		1	2
	Remover and Replacer, bearing, front wheel arm and compensating link—used with 41-H-1396-510 Handle.	41-R-2373-455			1
	Wrench, socket, road wheel arm spindle nut.	41-W-3416-300			1
	Wrench, plug, torsion bar retaining nut.	41-W-3638-50			1
	Lifter, road wheel.	41-L-1390-205		2	2
	Wrench, crowfoot, track tension adjusting.	41-W-871-85		1	1
76 MM Gun T91E3	Wrench, adjusting, closing spring housing.	J013-5570819			
	Wrench, tubular, pronged single end, 1-1/32 O.D. two prongs (FOR TRIGGER PLUNGER BUSHING).	41-W-3735-510			
	Tool, breechblock removing.	J013-7237269			
	Eyebolt, breechblock removing.	J013-7237268			
	Rod, spline shaft removing (used also for "T" handle with breechblock removing eyebolt).	J013-7238921			
	Sling Ass'y "E2" (Track and trolley).		839971		
	Gun, Refilling, Oil.	41-G-1362-500			

Power Pack Lifting Sling for the T41E1



This is the new adjustable-lifting-sling that's just Jim Dandy for handling the power-pack as a unit—or transmission or engine separately. If you can't get one from supply, here's how Ordnance can make it for you.





5/8″ DIAMETER ROD WITH WELDED REINFORCEMENT AT HOOK END.

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*Articles in this issue apply to other vehicles in the Light-Tank family, as indicated above.

Code letters shown identify the following vehicles:

A. T141 B. T18E1 C. M8E2 D. T98E1 E. T99 F. T194

The printing of PS Magazine, the PREVENTIVE MAINTENANCE MONTHLY, is approved by the Director, Bureau of the Budget (14 Feb 1952), and is distributed as follows:
ACTIVE ARMY: NGB (100); Tech Svc (5) exc 9 (250); Admin & Tech Svc Bd (25); AFF (10); OS Maj Comd (25); Base Comd (5); MDW (5); A (50); CHQ (5); Div (250) exc 17 (500); Brig (5); Regt (10); Sep Bn 6 (10); Bn (5); Sep Co (3); Co (5) exc 6 (10), 9 (25), 17 (10), 44 (10); FT (5); USMA (250); Sch (25) exc 9 (100); PMS&T (5) exc 9 (50); Dep (10); Tng Div (50); Hosp (10); GH Library (10); RTC (50); POE (3); OSD (2); PRGR (25); Ars (10); Dspln Bks (25); Rct Dist (3); Rct Sta (3); Engr Dist (3); Mil Dist (50); Proc Dist (3).
NG & ARMY RESERVE: None. For explanation of distribution formula see SR 310-90-1.

how to get what you need by the numbers

ORD 7 and 8 (with changes 1, 2 and 3), and ORD 9, SNL G-251, have been distributed. If you don't have your ORD 7 and its three changes, hit your publications section. But take it easy after you get them. They aren't quite up to date because so many parts were changed or superseded after the catalogs were compiled.

To speed up supply and get the right part, order in the regular way, but be sure to write the Manufacturer's Serial Number or the Ordnance Serial Number (of the tank that needs the part) on the requisition. That's about the only thing that'll tell the people at the depots which part is right for your tank. It will also tell a straight story to the Cadillac man who'll be at some point in the supply line to help edit each questionable requisition.

Brief yourself again, it's important: The Manufacturer's (or Ordnance) Serial Number must be noted for each part requisitioned—and this does **not** mean the USA Number.